Version 1.2.2

Now Integrates with Deepsky Stacker

By Steven S. Tuma

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Revision History

Version 1.1 - Initial Release (March 2009)

Version 1.2.2 (May 2009)

NEW: Added AVI Capture to the capture screen as its own tab. Now you can capture to a raw AVI file which is the preferred method for solar system imaging.

NEW: Added the ability to specify the path to where your captures get stored. It still defaults to the MyCaptureVideo folder but now you can change that in preferences.

NEW: Added Batch Image Cleanup to the FILE menu. This lets you apply leveling, de-interlacing, and hot pixel removal in a batch process by specifying an input and output folder. A lot faster than doing it one at a time.

NEW: Added a stopwatch to the video capture screen for manual timings.

BUG: Opening images in Windows Vista was painfully slow. This has been corrected.

BUG: Fixed capture settings bug that would give an error when clicking OK in the settings screen.

BUG: When using a custom capture size, the size shown in the preview window sometimes would not display at the specified size.

Introducing Deepsky Imaging

Welcome to Deepsky Imaging

Welcome to Deepsky Imaging. This software is designed to be used either with Deepsky Astronomy Software or as a standalone image enhancement program. The software can be used for image enhancement of CCD or other night sky photo's and includes many artistic image effects that you will also find useful for your family photos. While Deepsky Imaging is not meant to compete with the big boys of Imaging, like Photoshop & Maxim DL, you will surely find that its many enhancement options and file type choices will satisfy many of your image processing needs.

The software utilizes technologies from the world leading supplier of imaging toolkits, "Lead Tools" http://www.leadtools.com/. Lead Tools toolkits are optimized for use by business, document imaging, medical, and scientific applications. We are proud to offer so many advanced imaging capabilities as an alternative to higher priced software. Portions of this user manual were taken from the Lead Tools toolkit documentation as they explain some of the concepts very well.

FEATURES:

- Interfaces directly with Deepsky Stacker for awesome pre-processing of your images.
- Capture video from Stellacam, Mallincam, and other Composite or SVideo cameras.
    - Live video preview window.
    - Capture at a variety of resolutions. Uses Microsoft DirectShow.
    - Supports NTSC and PAL.
    - Capture to single TIF image or to uncompressed AVI file.
    - Manual "Quick" capture for testing the image quality.
    - Automatic sequencing
        - Converts AVI to a TIF image on the fly at point of capture.
        - Video processing lets you adjust brightness, contrast, hue, & saturation.
        - Auto manages saving of sequence to your computer.
        - Images saved use unique file naming convention.
        - Support for setting the interval in seconds between captures.
        - Support for ending the sequence after x number of captures.
        - Session capture history lets you easily capture additional images later.
- Supports many different image formats such as JPG, GIF, FIT, LEAD, TIFF including multi page images, BMP, PNG, PSP, PSD, ICO, CUR and many more. Over 30 formats supported.
- Deepsky Imaging supports opening 8, 16, and 32 bit FITS images including the FITS header. Saving of FITS files is not currently supported.
- Edit the first frame of an AVI or MPG file. Stellacam II and III owners who use video capture will appreciate opening up a single frame. Since these cameras do their own integration, you can

take several short exposures and use the first frame in each file and then finally stack those images to get a nice final image.

- Supports 12 and 16 bit grayscale images.
- You can open nearly any image format, make changes to it using Deepsky's enhancement tools, and save the image either back to its original file or to a new file. Even icons can be opened!
- Includes many image enhancement options such as : unsharp mask, guassian blur, cropping, annotation, median, binary filter, math filters, intelligent resizing, high pass filter, background subtraction, distort and 3D effects, Oilify, Glow, Impressionist, Wave Shear, Flip, Reverse, Rotate, Histogram, Brightness, Contrast, Intensity, Auto Color Level, Colorize, Solarize, Posterize, Lighting, Hue, Saturation, Remap Intensity, Spatial Filters, and many others.
- Unique history toolbar keeps copies of all your changes so you can go back to prior images.
- Convert an image from one file format to another.
- Increase and decrease color depth.
- Create simple animations by combining images together.
- Color Separation and Color Merge tools.
- Web tuner lets you play with JPEG, GIF, and PNG so that you can see the effect of file size and compression differences before saving the image.
- Region processing lets you select a portion of the image and perform processing on just that region.
- Supports TWAIN scanners.
- Thumbnail image browser lets you see a group of images in a folder, then selectively load the images into Deepsky Imaging.
- Full drag and drop support. Easily load any number of images by simply dragging them from Windows explorer.
- HTML Image Map creator.
- Advanced screen capture capabilities.
- Sophisticated Printing and Preview capabilities.
- Pan and Magnify tools included let you move around large images effortlessly, and magnify portions using the mouse.
- Deepsky Imaging remembers the last folder you used to open a file and takes you right back there the next time.

- Customizable toolbars let you hide or view them easily.

Installing the Software

System Requirements

- Windows 98, NT, 2000, ME, XP, 2003 Server, Vista 32 and 64 bit versions, Windows 7 Beta – Windows 95 is no longer supported but Deepsky Imaging may still work.
- A minimum of 512 megabytes is recommended. The more memory you have, the better.
- Screen resolution of at least 1024x768. You can still run the software at lower resolutions but some of the screen elements will be pushed off the screen.
- For image capture, you must have a Capture card compatible with Microsoft DirectShow.

Installation

- Run the Setup.exe to start the process.
- Answer all of the default prompts.
- When finished, run the software.

IMPORTANT NOTES:

1. If you are using Windows Vista or Windows 7 and encounter any installation problems, please make sure you run the setup.exe with Administrator permissions.
2. It's highly recommended that you have your Windows operating system up to date with patches and security fixes. You can run Windows Update manually by visiting the Microsoft website at http://www.windowsupdate.com
3. **Saving of captures may not work properly in Windows Vista if you use the default MyVideoCapture folder in the Deepsky Imaging folder. You can change this location in preferences or turn off Vista's UAC.**

Before we get started discussing the particulars, you may be interested in reading about some key terminology and concepts after you install the software.

Terminology Used in Deepsky Imaging

Annotations

Annotations, which are based on vectored drawing functions, are associated with an image only as an overlay of the displayed image. Use annotations to mark up your image without actually damaging the image. The individual annotation objects are stored in a separate file with the same name as the image, but with a file extension of .ANN.

Bias Frame

This is a zero length exposure taken with a CCD camera with the shutter closed. It is used to compensate for pixel specific offsets in the CCD chip and electronics.

Bitmap

A bitmap is the image data in memory.

CCD

This stands for Charge-Coupled Device and contains an array of light sensitive pixels.

Deepsky Stacker

This is an awesome freeware image stacking program that interfaces directly with Deepsky Imaging. The software is free to download and should be used if you are stacking images. http://deepskystacker.free.fr/english/index.html

Dark Frame

This is an exposure taken using a CCD camera with the shutter closed. The length of the exposure should match the length of normal exposures taken. Dark frames are used to help compensate for noise in the CCD camera ultimately resulting in better images when processed.

FITS

FITS stands for Flexible Image Transport System. This is the standard image format used by astronomers worldwide. FITS supports including a data header along with the image that contains information about the observation.

Flat Field Frame

This is an exposure taken of an evenly illuminated source. These frames are also used to compensate for noise and other artifacts.

Image History Toolbar

The toolbar used to record all image processing tasks so that the user can reload the image at any point in the process.

Lossy Compression

A **lossy compression** method is one where compressing data and then decompressing it retrieves data that may well be different from the original, but is close enough to be useful in some way. JPEG files use this method. Typically you want to process images in their non compressed form and save them to formats such as JPEG when you are all done with them.

Magnifying Glass

This magnifying glass provides a means of "zooming in" on the image loaded into the image. Use the "Magnifying Glass" if you want to:

- Control the painting options for the zoomed display.
- Set the contrast, gamma and intensity for the zoomed area.

Pan Window

The Pan Window is a small window which will display a scaled view of a bitmap, which is also being displayed in the Main Control's window at a size that would require scrolling. The Pan Window will maintain the image's aspect ratio. In the Pan Window, a colored Pan Rect will be displayed to indicate the portion of the image currently being displayed in the main window. When a user clicks inside the Pan Window and moves the mouse, while holding down the button, the Pan Rect will move with the mouse pointer.

Region

A bitmap region is an area of interest within an image. A bitmap can have only one region at a time, but the region can be complex, including, for example, multiple noncontiguous shapes. Deepsky Imaging allows you to perform most filtering and other enhancement tasks on the selected region.

Zoom View

This Zoom View provides a means of "zooming in" on the image loaded into the window to which it is attached. As the source rectangle is moved over an image, the zoomed - in view also changes. This is similar to having multiple Magnifying Glasses on the same source image.

Use the "Zoom View" if you want to:

- display one or more zoomed views for a single displayed image
- display an annotation in addition to the zoomed view
- display callout lines

Note that a "magnifying glass" is also available that can be attached to a window handle.

Use the "Magnifying Glass" if you want to:

- control the painting options for the zoomed display.
- set the contrast, gamma and intensity for the zoomed area

Concepts: Bits per Pixel and Related Ideas

The terminology for image formats can be confusing because there are often several ways of describing the same format. This topic explains what the terms mean.

If an image is 24 bits per pixel, it is also called a 24-bit image, a true color image, or a 16M color image. Sixteen million is roughly the number of different colors that can be represented by 24 bits, where there are 8 bits for each of the red, green, and blue (RGB) values.

A 32-bit image is a specialized true-color format used in image files, where the extra byte carries information that is either converted or ignored when the file is loaded. The extra byte is used for an additional color plane in CMYK files, which are specialized files for color printing. In that case, the software, by default, converts the values to 24-bit RGB values when loading the image. The additional byte may also be used for an Alpha channel, which carries extra information such as a transparency indicator.

If an image is 16 bits per pixel, it is also called a 16-bit image, a high color image, or a 32K color image. Thirty-two thousand is roughly the number of different colors that can be represented by 16 bits, where there are 5 bits for each of the red, green, and blue values. (Devices that specify 64K color support are also referring to 16-bit images, but they are counting the left-over bit.)

If an image is 8 bits per pixel, it is also called an 8-bit image or a 256-color image. Two hundred fifty-six is the number of different colors that can be achieved by using the image data as 8-bit indexes to an array of colors called a palette.

If an image is 4 bits per pixel, it is also called a 4-bit image or a 16-color image. Sixteen is the number of different colors that can be achieved by using the image data as 4-bit indexes to a palette.

If an image is 1 bit per pixel, it is also called a 1-bit image, a black and white image, a 2-color image, or a bitonal image. Two is the number of different colors that can be achieved by using the image data as 1-bit indexes to a palette. The palette can contain colors other than black and white, although black and white are most common.

If an image is *grayscale*, its red, green, and blue values are all the same, and the values are incremented from the lowest to the highest. For example, an 8-bit grayscale image has 256 shades of gray, with values from 0 to 255.

Concepts: Color Resolution and Dithering

Color resolution (also called color depth) refers to the number of possible colors in an image, as determined by the bits-per-pixel. If an image in your computer is loaded from a FAX scanner or received as a FAX transmission, it is a black-and-white (1-bit) image. If it is loaded from a color scanner or a JPEG

file, it can have 16 million colors. If it is loaded from a GIF file, it is likely to have 256 colors. There are many possibilities, ranging from two colors to over 16 million.

This software lets you manipulate an image and display it on any Windows-compatible device, regardless of the image's color resolution. Therefore, in most cases you can load, display, modify, and save an image without ever changing its color resolution. Nevertheless, in some cases you may need to increase or decrease the color resolution. Here are some examples:

- Suppose you need to load a large 24-bit image on a computer that does not have much memory. You can conserve memory by loading it as an 8-bit image. Then, if you were using an 8-bit display device, you would not see any difference in the quality of the image. Of course, there would be some loss of quality on a 24-bit display device, and the loss would be permanent if you then saved the image in the same file.
- Suppose you want to save an image in a different file format. If the new file format does not support the original color resolution, you can specify a different color resolution when you save the image.
- Suppose you want to combine one 8-bit image with another one. To combine two images, they must have the same color resolution, and if they are less than 16 bits per pixel, they must use the same palette. The simplest solution is to convert both images to 24 bits per pixel before combining them. Then, if necessary, you can reduce the color resolution of the combined image.

Whenever you reduce an image's color resolution to 8 bits per pixel or less, a *dithering* method comes into play. One alternative is to use a nearest-color match (no dithering), which means that the color of each pixel is changed to the palette color that most closely matches it. If the original image contains subtle color details, the result of a nearest-color match may have large blotches of color that are not very pleasing.

Dithering methods create the appearance of more subtle shades by mixing in pixels of different colors. This is similar to the way newspaper pictures produce the appearance of shades of gray, even though the only actual colors are black and white.

Ordered dithering is the fastest method. It is the default dithering method when painting to a display device that is 256 colors or less. Ordered dithering takes advantage of the fact that the colors in most palettes are ordered so that similar shades are next to each other in the palette. This method avoids blotches of color by adding to or subtracting from the nearest-color value of each pixel to ensure that adjacent pixels do not have exactly the same color. (If the colors in the palette are not ordered, the results are not good.)

All of the other dithering methods in the software use *error-diffusion* algorithms. In error diffusion, the *error* is the difference between the original pixel color and the nearest match, and *diffusion* of this error is what the algorithm accomplishes. *Floyd-Steinberg* is a high-quality, fast error-diffusion method. It is the default method that the software uses if you reduce the color resolution when loading or saving an image, or if you specify error diffusion as the dithering method when painting to a display device that is 256 colors or less.

If you use a function to change the color resolution of a bitmap in memory, you can choose from a list of possible dithering methods. All of the alternative error-diffusion methods are slower than Floyd-Steinberg, and the quality may or may not be better, depending on the original image, and depending on whether the resulting image is to be displayed or printed. Choosing an alternative dithering method is a subjective, trial-and-error decision. Stevenson and Arce dithering, the slowest of the alternatives, is most likely to produce a higher quality result.

There is a family of Reference Output Medium Metric (ROMM) BGR Color encodings that is a wide-primary output-referred extended color-gamut BGR color encoding. These encodings are used by digital still picture imaging systems to manipulate, store, transmit, display and print digital images. Unlike sRGB color encoding, the range of colors is not limited to those colors that can be displayed on a CRT monitor, and unlike e-sRGB, these encodings do not use negative RGB colorimetry co-ordinates.

ROMM color order can be used only with 24 or 48-bit bitmaps and is supported by the CMP/JPEG/Exif JPEG/JTIF/TIFF CMP file formats. There are colors that can be represented in RGB, but not in ROMM. Conversely, there are colors that can be represented in ROMM that cannot be represented in RGB. If you convert from one to the other you lose the colors that can be represented only in one of the colorspaces.

Concepts: Palette Handling

Any image that is 8 bits per pixel or less must have a palette. The palette is an array that contains the colors for displaying the image. The pixel values are indexes into the array. An image can have its own unique palette or it can share a common fixed palette. In either case, every bitmap in memory that is 8 bits per pixel or less has its own copy of a palette (even if it is a common fixed palette).

One way for a bitmap to have a unique palette is to load an image from a file that is 8 bits per pixel or less. In that case, the file contains a palette for the image, and you can assume that the palette is unique. By default, the software loads the palette that is stored in the file and associates it with the bitmap in memory.

Another way for a bitmap to get a unique palette is to create the palette. For example, if you reduce a 24-bit image to 8 bits per pixel, you can let the software create an optimized palette for the image.

By using a unique, optimized palette, you get the best possible image quality, but there is a drawback. When a display device uses a palette (for example, when it is in 256-color mode), it can only use one palette at a time to display colors. Therefore, if you are displaying more than one image at the same time, the current image may look perfect, while all of the others look bad, because they are mapped to the wrong palette. This is called *palette shift*.

Using a fixed palette solves these palette-shift problems. The best approach is to specify the fixed palette as a display option. Then, the software remaps each image to the fixed palette when it is

displayed, without disturbing the individual image's palette. (When displaying 16-, 24-, or 32-bit images on a device with 256 colors or less, the software always uses the fixed palette.)

Alternatively, you can use a color resolution function to specify a fixed palette for each individual image. But then, when you save the image to a file, the fixed palette is saved in the file, and any unique palette information is lost.

Important Technical information regarding Deepsky Imaging

- Deepsky Imaging can be used standalone or with the upcoming version of Deepsky Astronomy Software.
- This software utilizes Microsoft COM technologies. Future versions will use .NET.
- This software uses the world class imaging toolkit from Lead Tools version 14.5. Imaging is a tough area to write programs for so picking a high quality imaging toolkit from Lead Tools has simplified and reduced software development time for Deepsky Imaging. Programmers may be interested in visiting their website at http://www.leadtools.com/ to learn more about their toolkits.

Hot Tips for New Users and other Notes

- **HOT TIP:** Version 1.2.2 now supports capturing directly to an AVI file. This is the preferred method for capturing solar system images.
- **HOT TIP:** Download and install Deepsky Stacker, a freeware stacking program that interfaces with Deepsky Imaging. Before using it via Deepsky Imaging, make sure you set all settings in Deepsky Stacker since Deepsky Imaging uses those settings.
  http://deepskystacker.free.fr/english/index.html
- **HOT TIP:** If you are running a 64 bit Windows operating system and keep getting a message that Deepsky Stacker is not installed when you know it is, just go to OPTIONS under preferences and select the path to the DeepskyStackerCL.exe file.
- If an image is larger than the screen window, you can PAN the image by left clicking and holding the mouse button down while you drag the mouse. The toolbar at the top includes a FIT and 100% zoom factors to simplify working with large images.
- Use the reopen option on the FILE menu to reopen past images.

- Don't have a screen capture utility like Snagit? Use the advanced capture option on the FILE menu instead. It allows for capturing full screens, windows, and even regions.

- Select the eyeglass icon on the left toolbar to enable magnify mode. Now when you left click, a little zoom window will follow your mouse as you move it.

- Deepsky Imaging includes a very robust annotation feature that lets you add text and other markup to your images without actually affecting the images. You can add hotspots as well that link to web sites. There's a lot of functionality there if you are interested in it.

- You can open an AVI and MPEG video file to retrieve the first frame of the image. Unlock other software, only one image will be presented to you. This is useful if you are a Stellacam user who captures integrated video images with the Stellacam II or III. I use this method myself and it saves a lot of time.

- This software will read 8, 16, and 32 bit FITS images. Currently SAVE support is disabled for FITS but this will be added in the future. When a FITS image is shown on screen, you can click the FITS header icon to view information about the image.

- Use the Blinker feature to see if any movement can be detected in your images that you take over time.

- Deepsky Imaging includes over 100 imaging effects that can be used to artistically enhance your images. The opening splash screen used the Lens Flare effect under the Effects → Artistic menu. The end of this manual includes many examples showing you what these effects will do to your images.

- You have the ability to preview all effect changes prior to applying them to your image.

- The "Auto Level" button on the main toolbar can be used to automatically adjust the brightness of the image. To see how this works, open the sample image **orion-16.fits** . When it appears on the screen, the image appears all white. Now click the "Auto Level" toolbar button and the image will come into view. I've noticed that for many FITS images that "Auto Level" is needed to see the image.

- One of my favorite options in the software is called "Remap Intensity" which can be found under the Color menu → Transform. Here you can drag the line on the graph to change the intensity and brightness of the image.

- If you notice hot pixels in your image, you can run the "Remove Hot Pixels" function under the Effects → Noise menu. Run it more than once to remove more pixels.

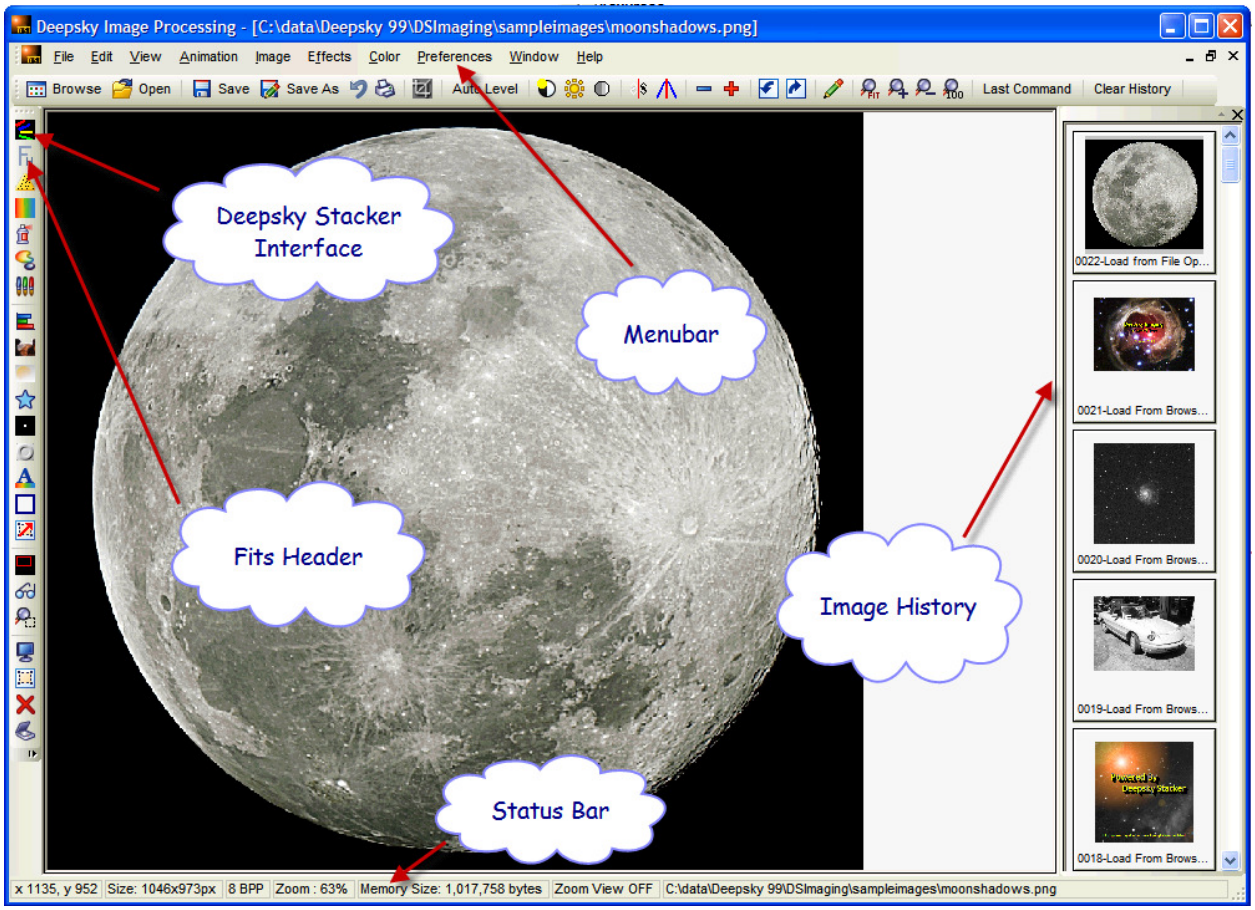
- Deepsky Imaging can also be used to enhance your non astronomy images as well. There are many tools like red-eye reduction and stitch images available for you to use.

Touring Deepsky Imaging

Quick Tour

Deepsky Imaging utilizes an MDI application similar to Microsoft Word and other popular applications. This simply allows the user to open as many child windows as they want, making it easy to load many different images in the software at the same time. The software consists of several toolbars that contain commonly used functions and are customizable. The image history toolbar is special. It saves a copy of the image to your hard disk prior to performing some enhancement function on it. Thumbnails of these saved images show up in this toolbar and you can click one to load that image back into the editor. Each toolbar icon will display a tooltip when you hover over it which tells you what the icon is used for.

The menu bar at the top contains all of the features you will use in the software. The most popular features have been also placed on one of the toolbars to make it more accessible. Finally, the status bar at the bottom of the screen will always display useful information about the currently selected image showing on the screen. Here you can see the image size, bit depth, zoom %, size and name of the image.


Deepsky Image Processing - [C:\data\Deepsky 99\DSImaging\sampleimages\moonshadows.png]
File Edit View Animation Image Effects Color Preferences Window Help
Browse Open Save Save As Auto Level Last Command Clear History
Deepsky Stacker Interface
Menubar
Fits Header
Image History
Status Bar
0022-Load from File Op...
0021-Load From Brows...
0020-Load From Brows...
0019-Load From Brows...
0018-Load From Brows...
x 1135, y 952 Size: 1046x973px 8 BPP Zoom : 63% Memory Size: 1,017,758 bytes Zoom View OFF C:\data\Deepsky 99\DSImaging\sampleimages\moonshadows.png

Opening an Image

For the most part, Deepsky Imaging is easy to use. It functions similar to other image programs you may have used in the past. Let's examine the four ways we can open an image using Deepsky Imaging.

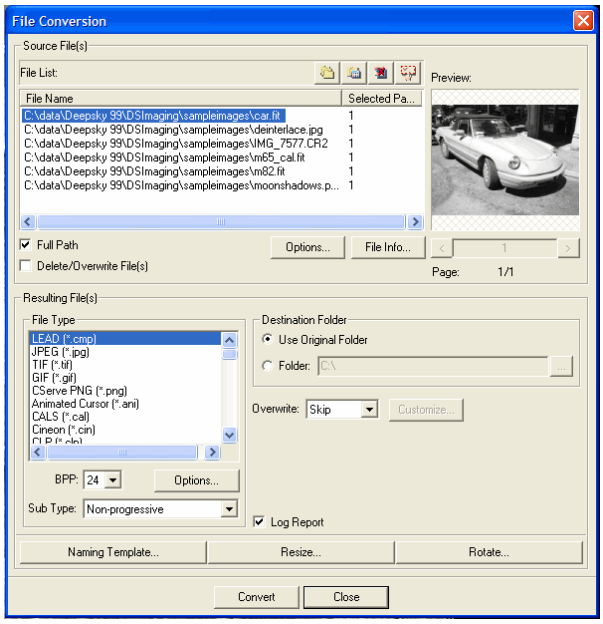
1. Select FILE → OPEN or click the **Open an Image** Icon on the toolbar.
2. Drag any image(s) from Windows Explorer into the Deepsky Imaging window.
3. Selet FILE →BROWSE or click the BROWSE toolbar button to select a folder on your system and have thumbnail images shown for each image. To open the image, just click the thumbnail. You can leave the browser open while you work in case you want to open another image.
4. The next version of Deepsky Astronomy Software will interface directly to Deepsky Imaging. While using Deepsky Astronomy Software, you will be able to double click images you see in the software and have them shown in Deepsky Imaging.

Saving Images

Once you have an image open, you can save it at any time using the **SAVE** or **SAVE AS** buttons. For a few image formats like **JPEG**, you will only be able to do a **SAVE AS** so that you don't save over the original image. Since **JPEG** uses compression, every time you save the image, quality is lost. If you click the **SAVE** icon by mistake, don't worry, you will be prompted to save it to a different filename.

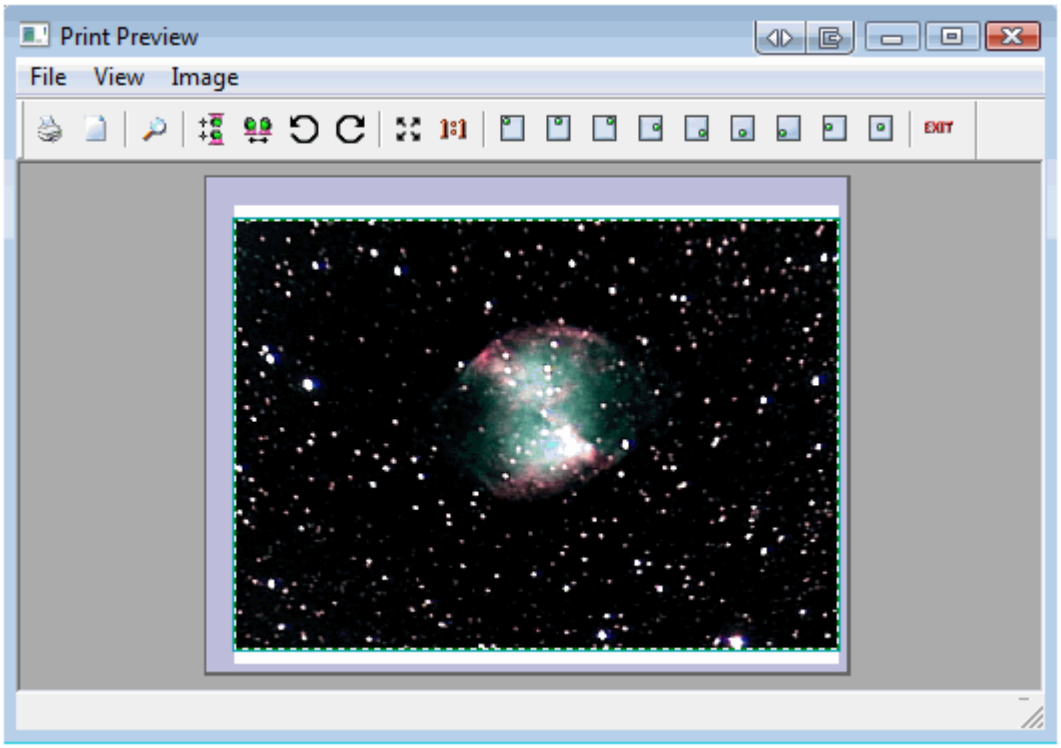
The **Convert** option on the **FILE** menu gives you extensive capability to save your image into another file format, utilizing special attributes of that format. For example, if you convert a file to JPEG, you have the option of specifying bit depth, sub type, quality factor, and other options.

The **Convert** option even lets you specify a folder to do a batch conversion of all of the images in that folder. You have the ability to take multiple format images in one folder, and convert them to a single format placing them in another folder. You can even resize them or rotate them.

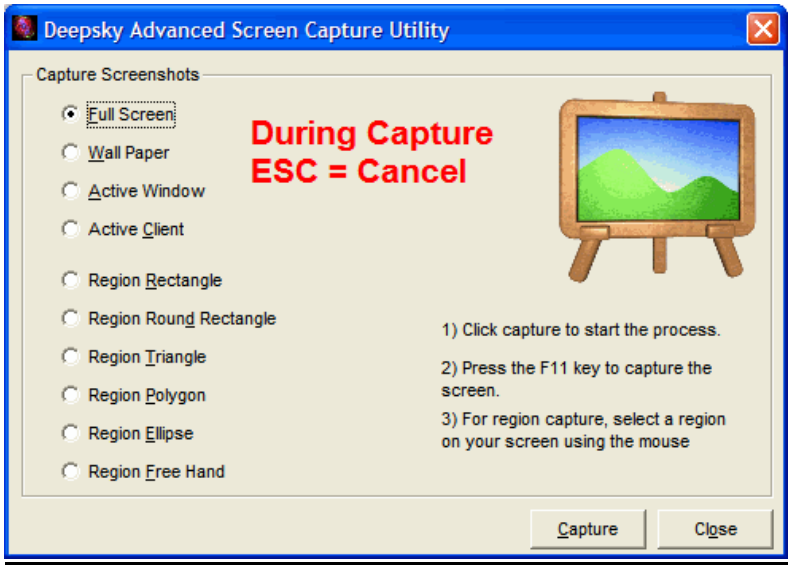


Printing Images

Printing images couldn't be easier in Deepsky Imaging. Once you have an image ready to print, you can either print it right away or you can preview it first as shown below.



Screen Capture



Deepsky includes some pretty awesome screen capture capabilities. You can quickly capture the screen by going to FILE →CAPTURE SCREEN. Deepsky Imaging will minimize its own window and then take a full screenshot of whatever is on your screen, loading the captured image into Deepsky Imaging. For finer control, use the **Advanced Capture** located on the **FILE** menu. This easy to use, yet flexible capture utility will let you capture a screen in a multitude of ways.

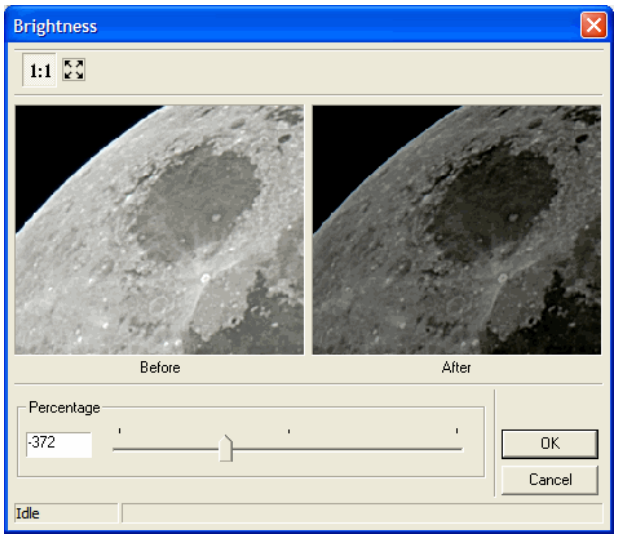
IMPORTANT: After clicking **Capture**, make sure you HIT **F11** to take the screenshot.

- *Full Screen* – captures your entire computer screen.
- *Wall Paper* – captures your desktop wallpaper without including your icons
- *Active Window* – captures the active window (the one with focus)
- *Active Client* – captures the active client (without the window's title bar)
- *Region Capture* – uses the selected option to capture the screen in the shape you have selected. For example, if you select **Region Free Hand** you can use the mouse to draw around an object on the screen. These options give you a lot of flexibility.

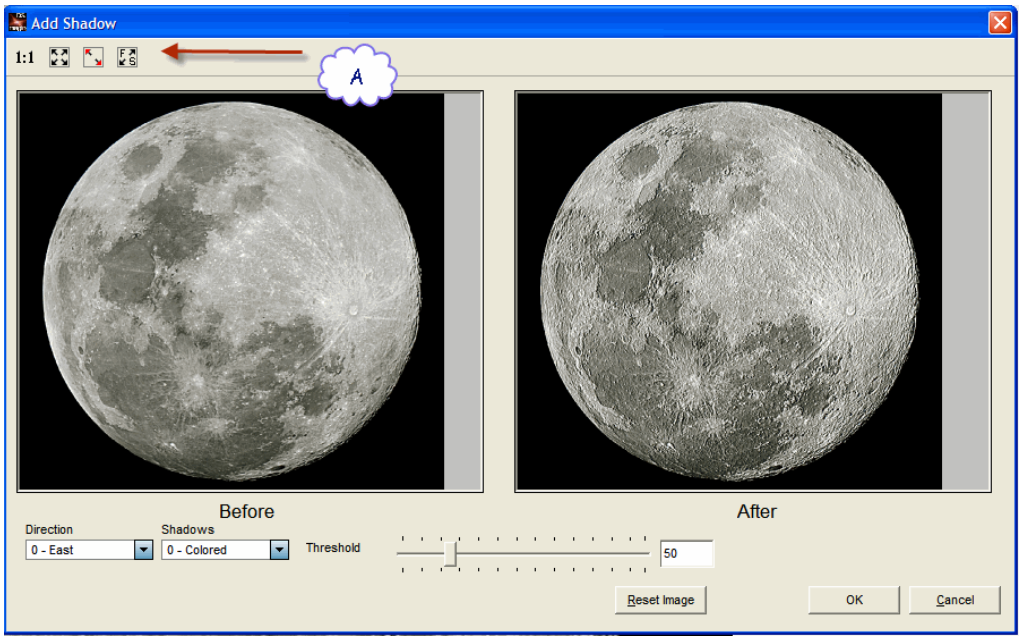
NOTE: For Region capture, after you click the capture key in Deepsky Imaging, find the area you want to select and press F11. Once F11 is pressed, you will be able to highlight the region you want to capture. When you release the mouse button, the image will be transferred back into Deepsky Imaging.

Common dialogs used in Deepsky Imaging

Before we take off looking at all of the options Deepsky Imaging gives you, I want to briefly touch on dialog screens you will see when using the software. These dialogs give you the opportunity to apply some effect to the preview image prior to applying the effect to the main image. A simple dialog screen such as the "Brightness" adjustment dialog provides a simple slider to adjust the brightness. If you click OK, the effect will be applied to your image.



Other dialog screens may have additional options. For instance, the "Add Shadow" screen lets you create a 3D effect on the image which mimics shadows.



Each screen will have controls that let you adjust the size of the image. The common controls include:

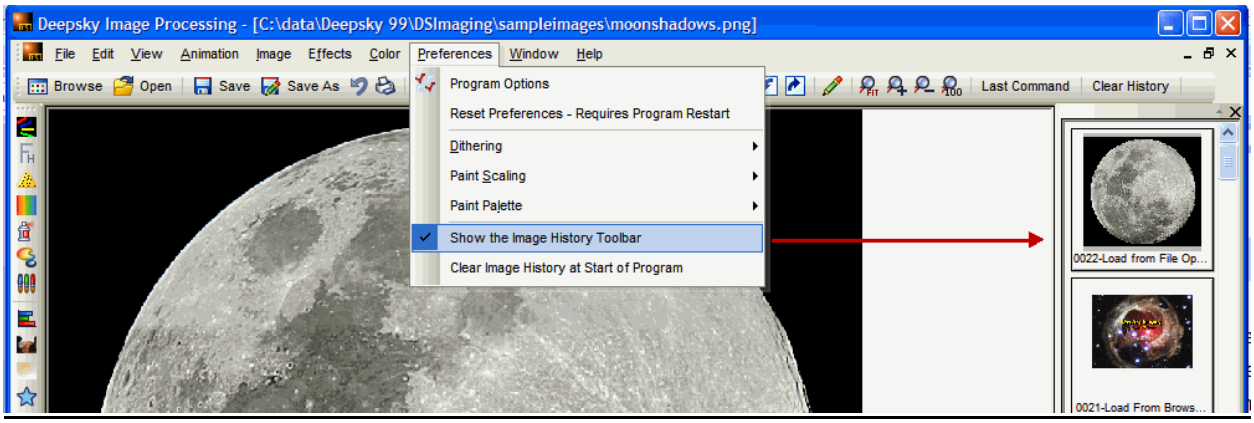
Scale Mode – you can adjust the scale mode (A) to view the image at a normal size, or view it so that the entire image fits the preview screen. If the image is larger than the preview screen and you have **1:1** set, you can use the mouse to drag the image around until you find the point of interest you are looking at.

Reset Image – this button reloads the preview screen with the original image without any of your changes. You will find this option useful as you try different parameters on the dialog as you experiment with different effects.

OK – click this button to apply your changes to your main image. If you make a mistake and want to undo the operation, simply click the **UNDO** button on the toolbar. This button lets you go back one processing task. If you want to go back further that that, you should use the **Image History Toolbar**.

Image History Toolbar

The image history toolbar keeps track of all your changes to an image. You can use it as kind of a super UNDO function, to revert back to earlier versions of your images. Prior to making changes to an image, Deepsky will make a copy of your image, placing it in the HISTORY folder. If you make a mistake on an image, you can find a suitable copy of the image in the history toolbar, and click the thumbnail to load the image back into Deepsky Imaging. Keep in mind, that the image will be loaded into its own new window, so your other image will still be there unless you close it.


Deepsky Image Processing - [C:\data\Deepsky 99\DSImaging\sampleimages\moonshadows.png]
File Edit View Animation Image Effects Color Preferences Window Help
Browse Open Save Save As
Program Options
Reset Preferences - Requires Program Restart
Dithering
Paint Scaling
Paint Palette
Show the Image History Toolbar
Clear Image History at Start of Program
Last Command
Clear History
0022-Load from File Op...
0021-Load From Brows...

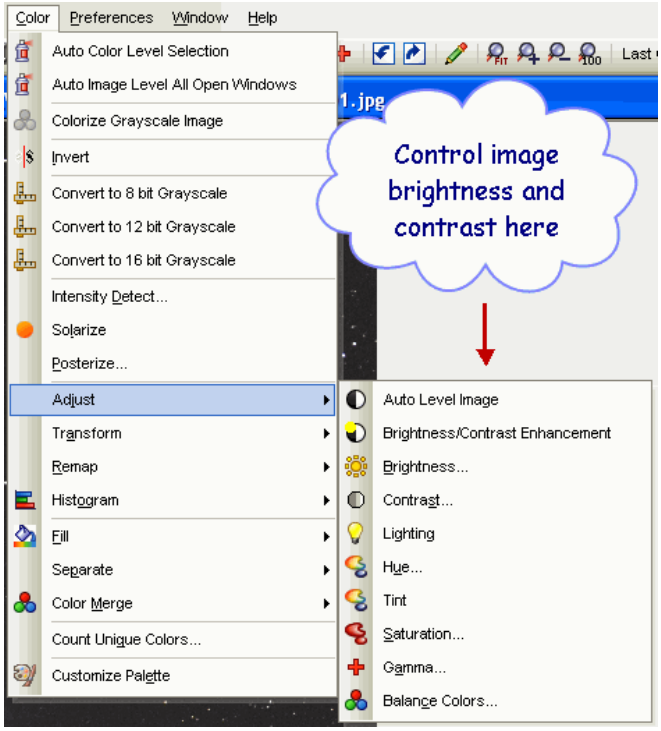
All of the images in the history toolbar can be left there indefinitely as long as you don't run out of disk space. What you may want to do is select the **CLEAR HISTORY AT START OF PROGRAM** option located on the Preferences menu. When you have this selected, each time you start Deepsky Imaging, all of the images in the history folder will be deleted. You can also clear the history toolbar via the "Clear History" button on the toolbar. This gives you a little more control over when and when not to clear the history.

Special Note regarding the history Toolbar:

The images in the toolbar are saved as JPG files (with no compression) even if you are working in another image format. Please keep this in mind if you reopen an image from the history toolbar. Also, if you notice that Deepsky Imaging is taking longer to start up, then clear the image history toolbar.

Adjusting Brightness, Contrast, and Level of your Image

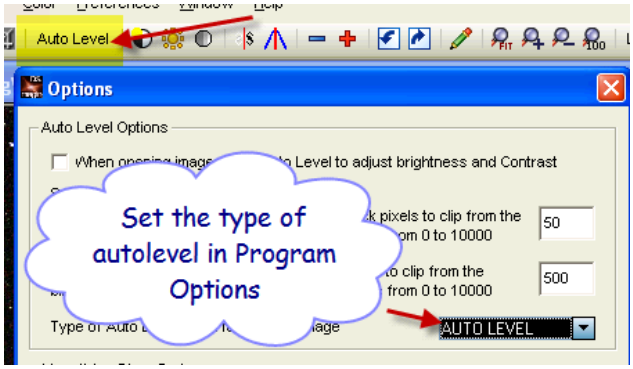
One of the most basic image processing tasks is adjusting the brightness, contrast, and intensity of an image. Deepsky provides several tools to do this. These options are located on the **ADJUST**



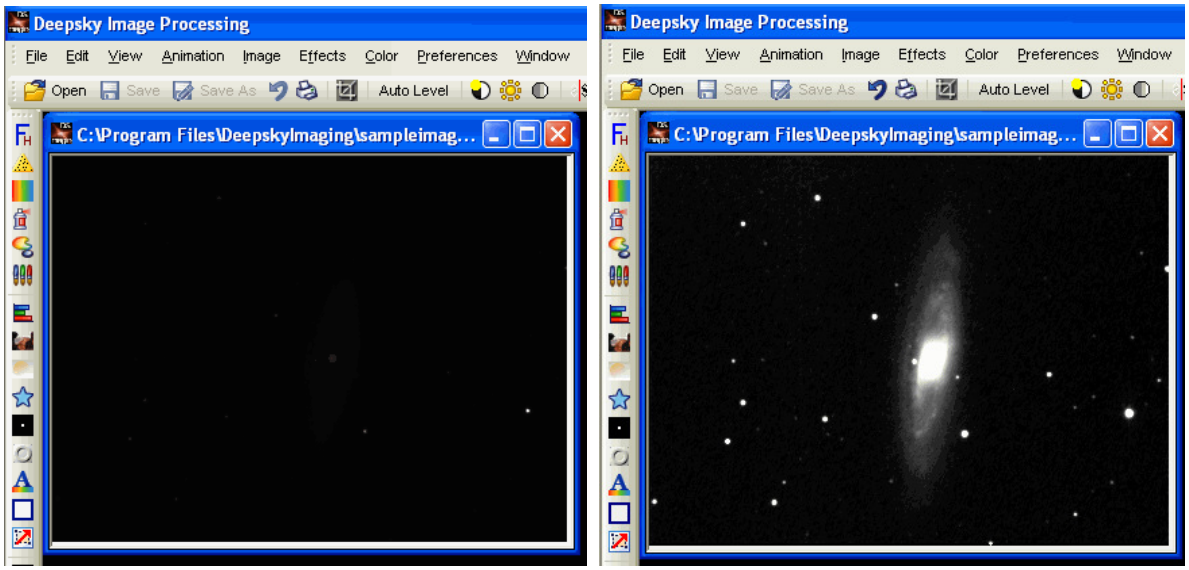
menu which is located on the **COLOR** menu. The **Brightness** and **Contrast** options let you adjust them independently whereas the **Brightness Contrast Enhancement** option combines these tools. A variety of other tools like **Gama**, **Saturation**, and **Hue** let you further control all aspects of the image's brightness and color.

The Auto Level Feature

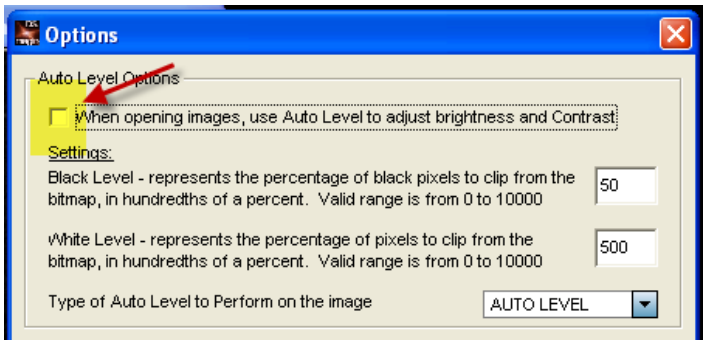
You can use the "Auto Level" feature to automatically adjust the Level, Contrast, and Intensity of the image. There are several tools available to accomplish this. A quick leveling button is displayed on the toolbar and is configured under Preferences → Program Options.



To see how this feature works, open up the **m65_cal**.fit file located in the sample images folder. You should see the image as it appears below (left). Now, click the **Auto Level** button on the toolbar. The details of the image will become visible as shown in the right image.

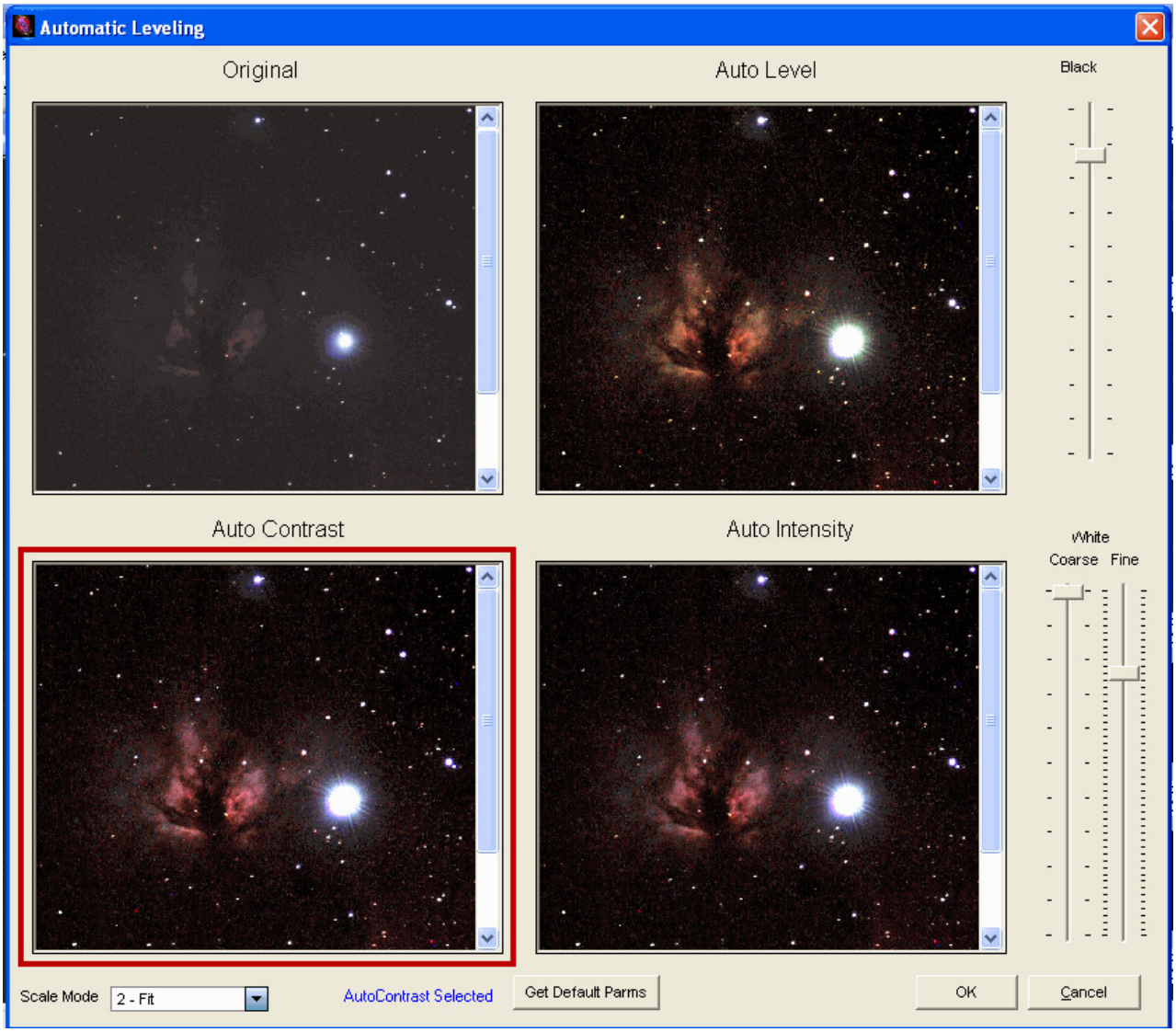

Deepsky Image Processing
File Edit View Animation Image Effects Color Preferences Window
Open Save Save As Auto Level
C:\Program Files\DeepskyImaging\sampleimag...
Deepsky Image Processing
File Edit View Animation Image Effects Color Preferences Window
Open Save Save As Auto Level
C:\Program Files\DeepskyImaging\sampleimag...

You can have Deepsky Imaging auto level the image on Open by clicking the checkbox in Program Options. You can also configure the black and white level to adjust the amount of leveling that will be used.


Options
Auto Level Options
When opening images, use Auto Level to adjust brightness and Contrast
Settings:
Black Level - represents the percentage of black pixels to clip from the bitmap, in hundredths of a percent. Valid range is from 0 to 10000
50
White Level - represents the percentage of pixels to clip from the bitmap, in hundredths of a percent. Valid range is from 0 to 10000
500
Type of Auto Level to Perform on the image
AUTO LEVEL

Not all images will require leveling all of the time. For convenience, a comparison tool is also available on the **Color** menu named "Auto Color Level Selection". This tool displays four images that you can

review to see which one looks best. You can adjust the black and white settings and select the image you want to use.

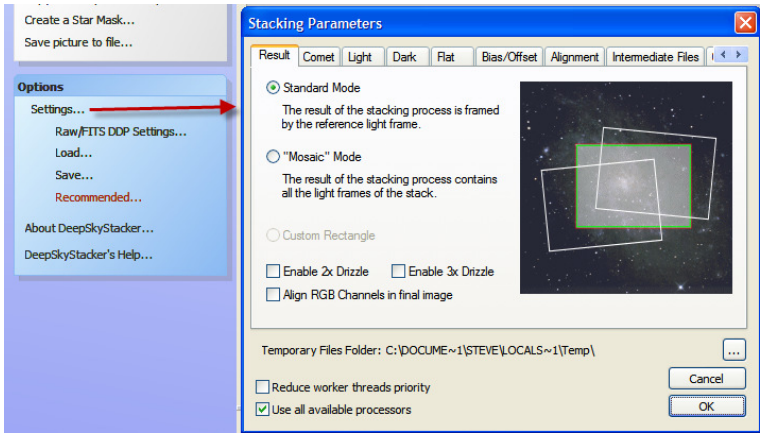


Aligning and Stacking Images

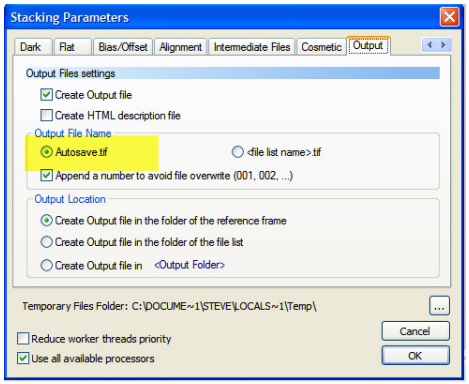
Taking multiple short exposure images of your favorite deep sky object is common practice these days in order to average out the noise in each individual image, resulting in a better quality image. Deepsky Imaging provides an excellent interface into Deepsky Stacker which allows you to take advantage of all of its stacking features. Before using this interface it is important to go into Deepsky Stacker and set your settings because Deepsky Stacker uses those settings when you are in the Deepsky Stacker Interface. Make sure your settings are saved.

Deepsky Stacker can be downloaded free: http://deepskystacker.free.fr

Deepsky Stacker is an awesome program for stacking images. If you are new to imaging, you might not know which settings to use. The best thing to do is to learn how Deepsky Stacker works and review its help manual. When I first started using Deepsky Stacker I was up and running stacking images in 15 minutes or so. Go to the options area in Deepsky Stacker and look at the various options. Start with SETTINGS as shown below. I went to the LIGHT tab and selected MEDIAN for the stacking mode.



Now go to the OUTPUT tab (you can hit the right arrow to see more tabs) and make sure the OUTPUT FILE NAME (show highlighted below) is set to **Autosave.tif.** Deepsky Imaging expects the final image from Deepsky Stacker to be called this name.

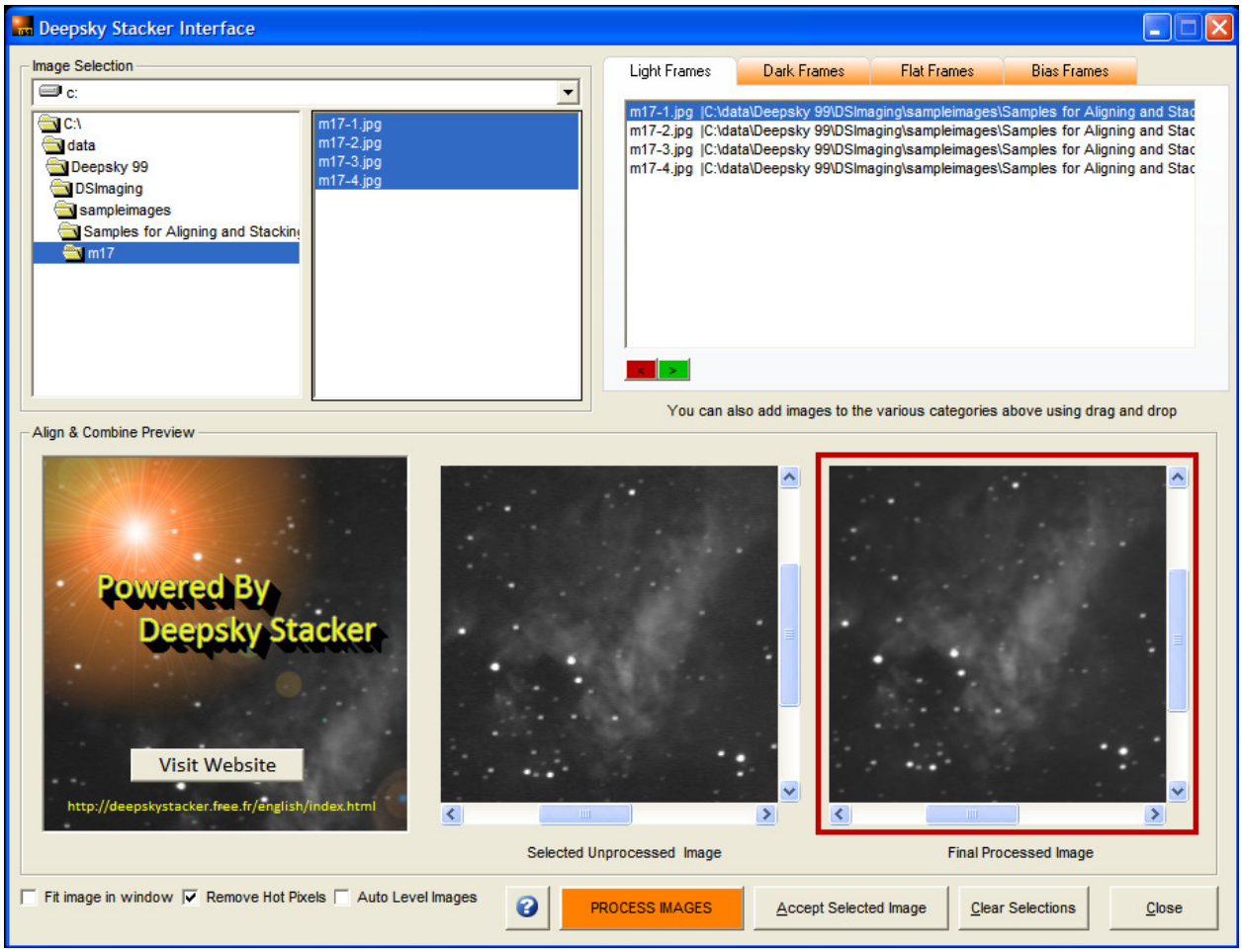


Once you have them set the way you want, click SAVE. You can now use the Deepsky Stacker Interface.

Using the Deepsky Stacker Interface

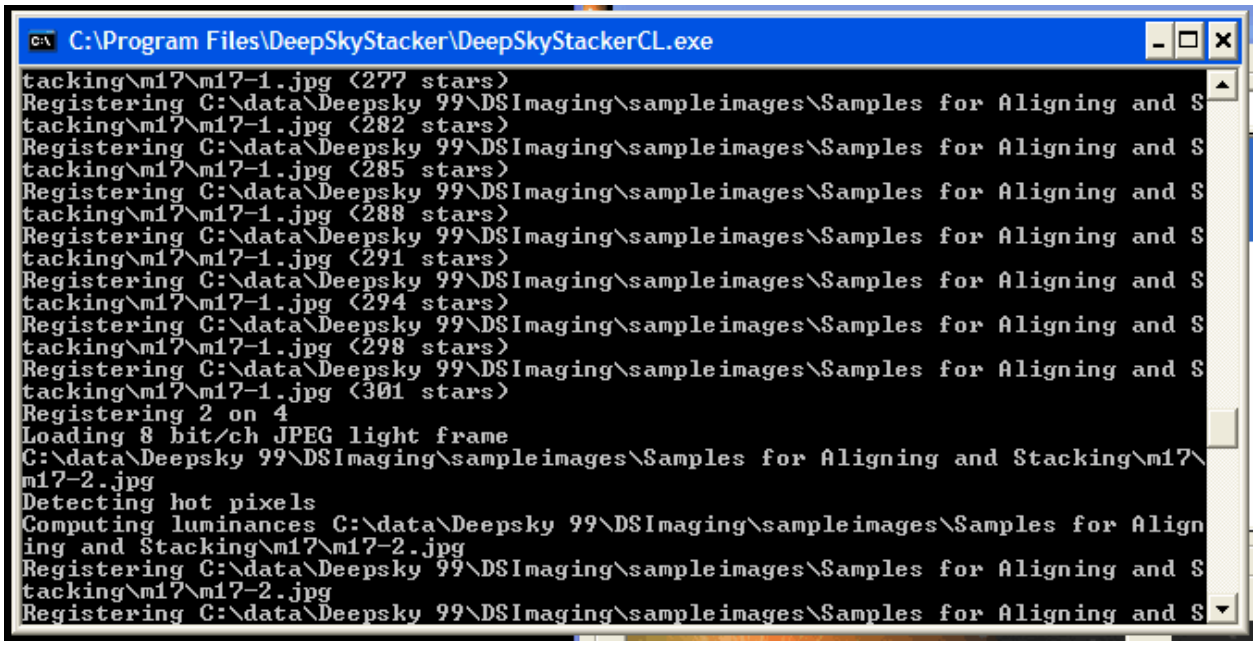
To see the Deepsky Stacker Interface in action, open up Deepsky Imaging and go to **Image** menu and select the *Align & Stack by File Selection* option:

When the Deepsky Stacker Interface screen appears, select the *sampleimages* folder under Deepsky Imaging and drill down to the M17 folder. These sample images are in JPEG format to illustrate that you can use any image format here, however we recommend using formats that don't use lossy compression.



Highlight the 4 images in that folder and drag them over to the *Images (Light)* list box. You can also drag and drop files from Windows explorer into each tab. You can click on each image if you want and the image will be displayed in the preview window. Now click the *PROCESS IMAGES* button at the bottom center of the screen. Deepsky Imaging will then call Deepsky Stacker to stack the images automatically

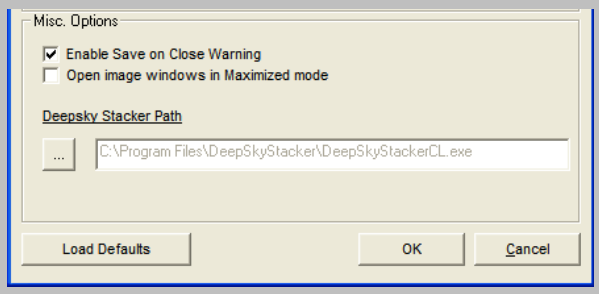
using the Deepsky Stacker settings you first set up. As Deepsky Stacker processes your images, you will see a command window like the one shown below.


C:\Program Files\DeepSkyStacker\DeepSkyStackerCL.exe
tacking\m17\m17-1.jpg (277 stars)
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-1.jpg (282 stars)
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-1.jpg (285 stars)
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-1.jpg (288 stars)
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-1.jpg (291 stars)
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-1.jpg (294 stars)
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-1.jpg (298 stars)
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-1.jpg (301 stars)
Registering 2 on 4
Loading 8 bit/ch JPEG light frame
C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and Stacking\m17\
m17-2.jpg
Detecting hot pixels
Computing luminances C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Align
ing and Stacking\m17\m17-2.jpg
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S
tacking\m17\m17-2.jpg
Registering C:\data\Deepsky 99\DSImaging\sampleimages\Samples for Aligning and S

When the stacking process finishes, the command window will disappear and the final stacked image will appear in the Deepsky Stacker Interface screen (final processed image). To use this stacked image in Deepsky Imaging, you can double click it or click the *Accept Selected Image* button.

IMPORTANT SETUP NOTES:

(1) If you install Deepsky Stacker into its default location under C:\Program Files, then Deepsky Stacker is ready to go. If you installed it somewhere else, you should go into Deepsky Imaging *Program Options* under the preferences menu and locate the DeepskyStackerCL.exe file as shown.



(2) If you are using a 64 bit Windows operating system, you should go into the above screen and select the DeepskyStackerCL.exe file manually. This is necessary because 64 bit operating systems will install 32 bit applications into C:\Program Files (x86)\ . So if you keep seeing a message telling you Deepsky Stacker is not installed and you know it is, just set the path in Deepsky Imaging and you are good to go.

Here's an example of using the Deepsky Stacker Interface. The image on the right was stacked by using 4 AVI files taken with the Stellacam III. The Deepsky Stacker Interface takes care of using the first frame of each AVI file. You simply drag the AVI files into the Deepsky Stacker Interface and start stacking away. No more having to manually extract a single frame from your AVI files.

New Data
Single Raw Frame from Stellacam III
Notice how this image has more noise in it.
New Data
Stacked using Deepsky Stacker via DSI. 4 frames

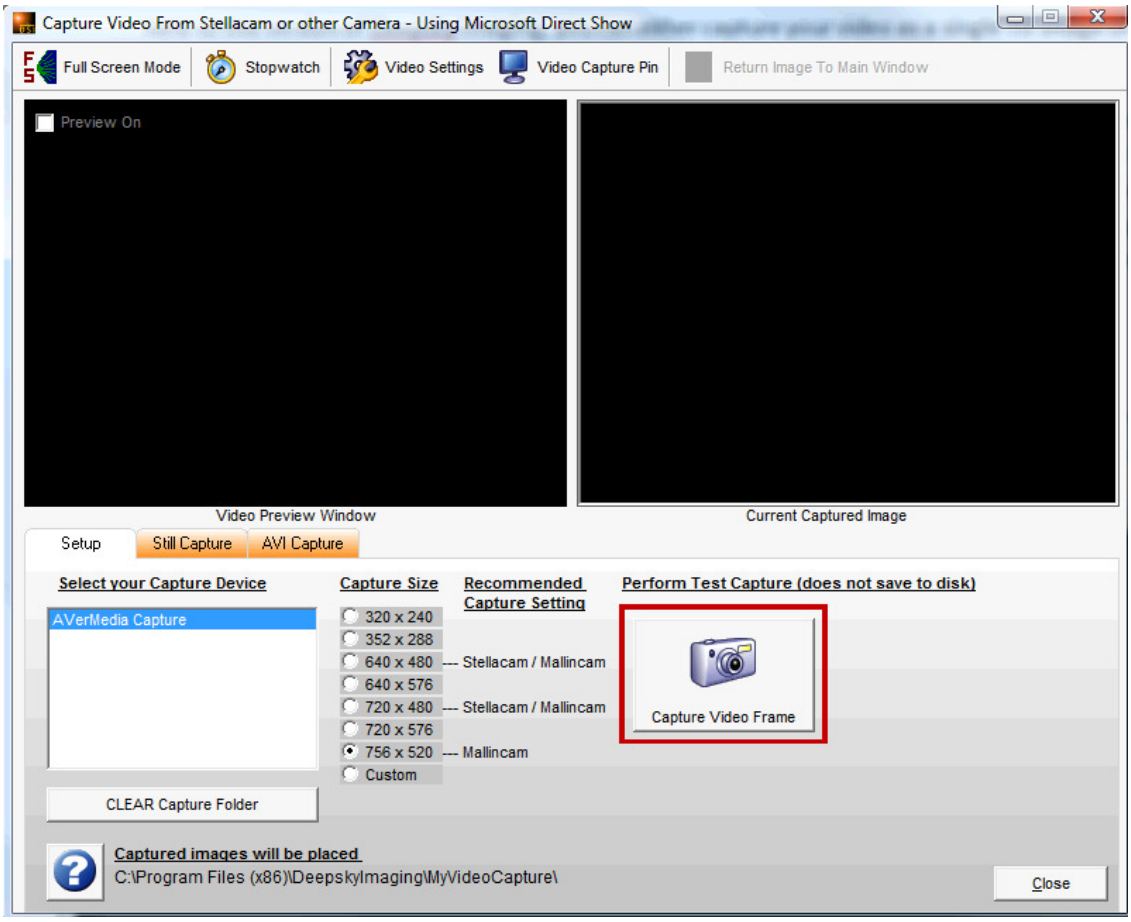
Interfacing to Stellacam, Mallincam, & Other Video CCD cameras

As a newcomer to the world of CCD imaging, I started out using a Stellacam II and then III video cameras for recording my images. These cameras are good for taking short exposure integrated videos of deep sky objects, but you have to capture the video using a capture card and save the video as an AVI file.

If you own a Stellacam, http://www.astrovid.com/further_details.php?pid=3306 or a Mallincam, http://mallincam.tripod.com/ you will know that these cameras are integrating cameras that accumulate frames as the image is being taken. Once the image is complete, you can capture the image as an AVI file and convert it into a TIF or other bitmap. Since the camera only outputs video you will need to capture it using a USB capture card that connects the camera to the USB capture card.

Deepsky Imaging includes video capture support for Video CCD cameras that output composite or SVideo. This includes the Stellacam and Mallincam line of cameras. Video CCD cameras do an excellent job of capturing deep sky objects and are ideal for beginners of astronomical imaging because good results can be obtained on an alt/azm mount without auto guiding. I captured the following image using my 8" LX200R with the Mallincam Color. The final image is a stack of eight 28 second frames.

Capturing Video in Deepsky Imaging



TIP: New to this version of Deepsky Imaging, you can either capture your video as a single TIF image or as an uncompressed AVI file.

If you go the TIF route, capturing video is easy in Deepsky Imaging because it takes care of converting the raw AVI image from the camera into a TIF image. It then stores the result in an organized folder, called **MyVideoCapture**, under the Deepsky Imaging program folder. Windows Vista users may have trouble saving captures to this folder unless UAC is turned off or they run Deepsky Imaging as an Administrator. New to this version, you can specify a different path in preferences so that the captures get stored in a folder that Windows Vista likes.

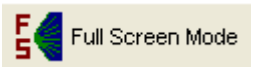
The capture screen is broken down into a couple areas.

- Toolbar
- Preview Window

- Capture Window
- Setup Tab
- Capture Tab

Toolbar

The toolbar is used to specify whether to scale the video preview window, fit the video to it, change video settings, and return a test capture back to Deepsky Imaging.



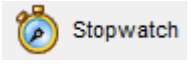
This puts you in full screen mode to aid in focusing or to view live video.

Sets the video preview at its actual size.

Fits the video to the preview window so that the entire image is shown.

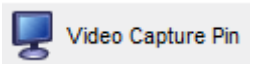
Stretches the video to take up the entire preview window.

Displays the video double its normal size.

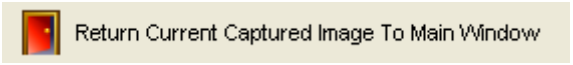


Use this button to manually time your exposures.

Sets various video settings including video decoder, processing, & video source. The screen that shows when this is selected is dependent on your video capture card driver.

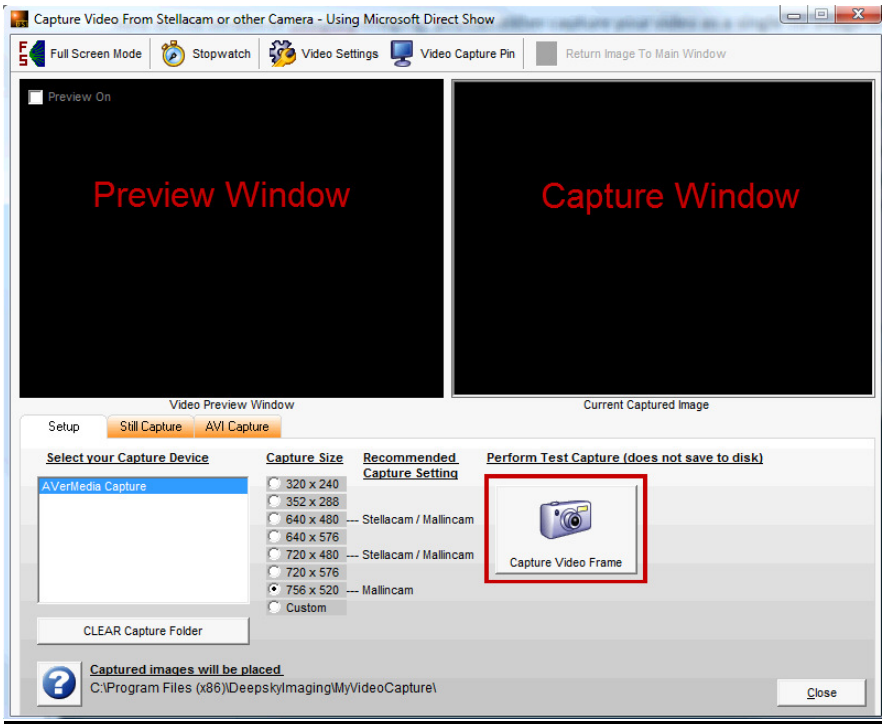


Sets additional video settings. The screen that shows when this is selected is dependent on your video capture card driver.



Takes the captured image and returns it to Deepsky Imaging.

Video Preview Window



The video preview window is where the live video will be shown. You can view the video in Normal mode or Full Screen mode. Full Screen mode is useful for focusing or for viewing live images; however you will need to return to Normal mode to capture images. You can go into Full Screen mode by clicking the FULL SCREEN MODE icon on the toolbar. To return to Normal Mode, you can click the EXIT FULL SCREEN button. While in either mode, you can also adjust some video parameters under V**ideo Settings** to brighten or darken the image.

TIP: Use Full Screen mode to help achieve focus or to view live video. Clicking the "Display the video double its normal size" icon will show an even larger image.

Capture Window

The window will show you a single frame capture of the object you are imaging. This image is the result of the integrated exposure from the camera.

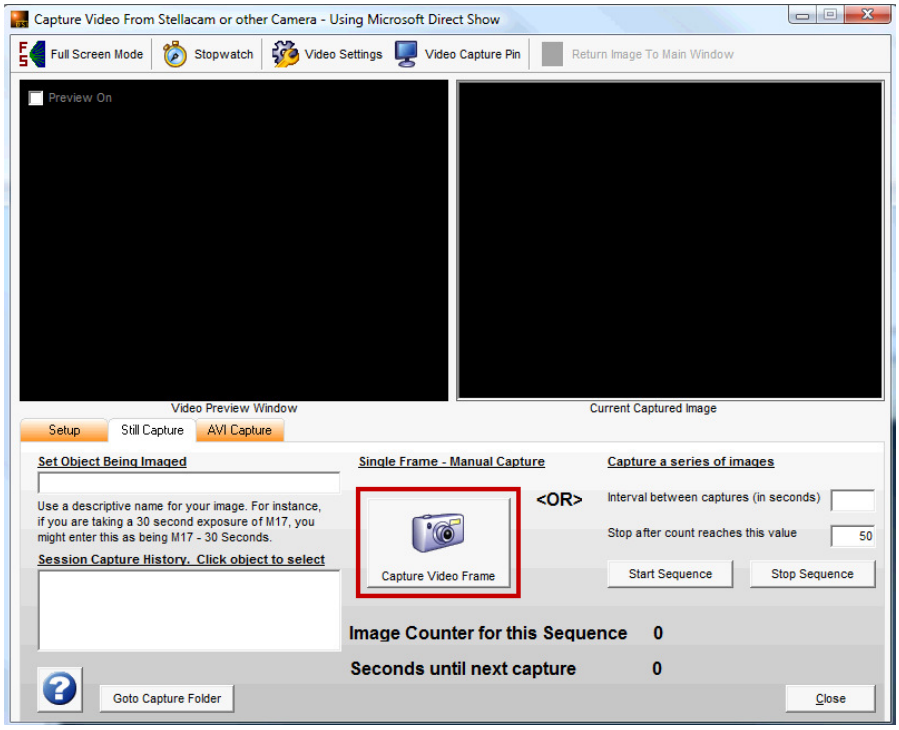
Setup Tab

The Setup tab is where you select your capture device, capture size, perform a manual "quick" capture, and clear the **MyVideoCapture** folder.

IMPORTANT NOTE : Not all capture sizes will work with your camera. If one doesn't work for you, try another. If none work, you can put in a custom size like 520 x 280 at the bottom and then click **APPLY**. 640x480 seems to work well for Stellacam and Mallincam video cameras. Other cameras such as webcams may require the custom setting.

Still Capture Tab

The still capture tab is where you will be capturing your images as TIF files, either 1 at a time manually, or using the automated capture process.


Capture Video From Stellacam or other Camera - Using Microsoft Direct Show
Full Screen Mode
Stopwatch
Video Settings
Video Capture Pin
Return Image To Main Window
Preview On
Video Preview Window
Current Captured Image
Setup
Still Capture
AVI Capture
Set Object Being Imaged
Use a descriptive name for your image. For instance, if you are taking a 30 second exposure of M17, you might enter this as being M17 - 30 Seconds.
Session Capture History. Click object to select
Single Frame - Manual Capture
Capture Video Frame
<OR>
Capture a series of images
Interval between captures (in seconds)
Stop after count reaches this value
50
Start Sequence
Stop Sequence
Image Counter for this Sequence 0
Seconds until next capture 0
Goto Capture Folder
Close

The **object being imaged** text box is where you put the name and other info about the object being imaged. This information will be a part of the file name for each saved image.

Session Capture History will contain a history of objects that you have imaged during this session. You can go back later and select one from the list and take additional images and they will be stored in the same folder. For example, let's say you take 5 exposures of M17 and the name you gave is "M17 – 30 seconds". You then move on to another object. If you wanted to later in your observing session take additional images of M17, you can select M17 from the history list and all new images will be stored in the same folder as before.

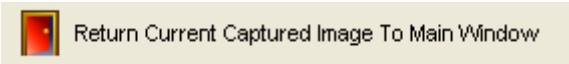
Single Frame – Manual Capture is used to capture 1 integrated frame. The image will be saved to the folder name you indicate in "Set Object Being Imaged". You might use this option if using the red switch on the Stellacam III to control the exposure.

Capture a series of images will enable you to image the same object at different intervals all automatically. For example, you can enter 30 for the interval and 10 for the "Stop after Count" to capture 10 images of 30 seconds each. Once captured you would later stack the 10 images to achieve a

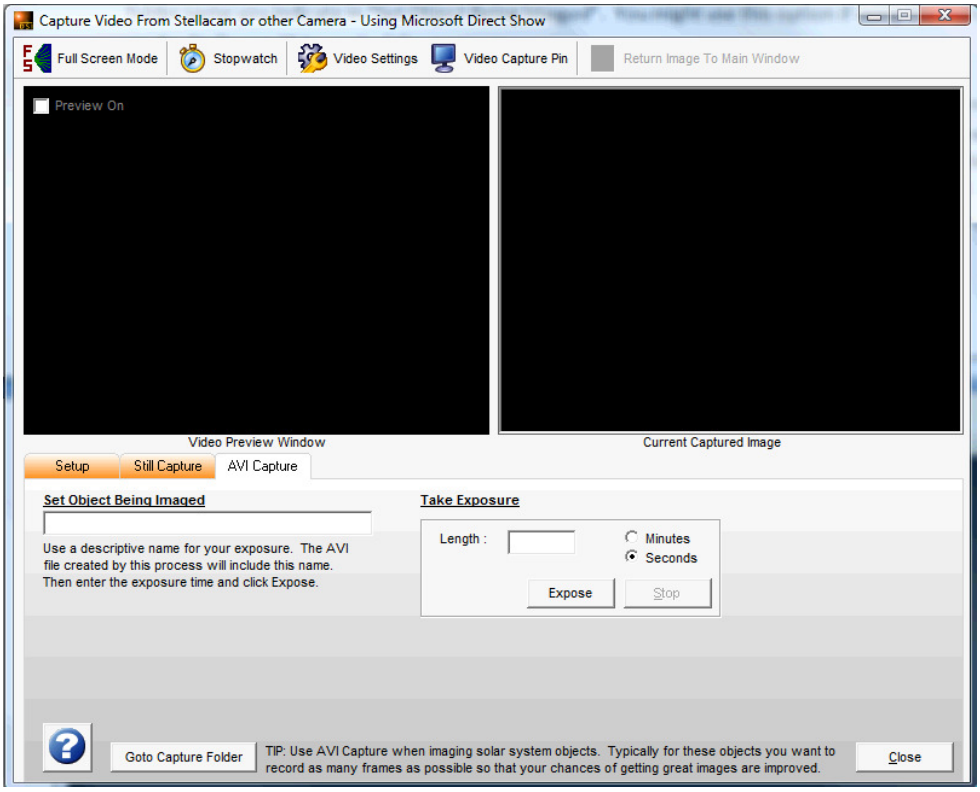
final averaged image that contains less noise. You can also control stopping the sequence manually, if you are not sure how many images you will take.

The **Goto Capture Folder** will open Windows Explorer so that you can manage your images.

Click the **Return Current Captured Image to Main Window** at any point to send the image in the preview window back to the main Deepsky Imaging window by clicking the following toolbar button:



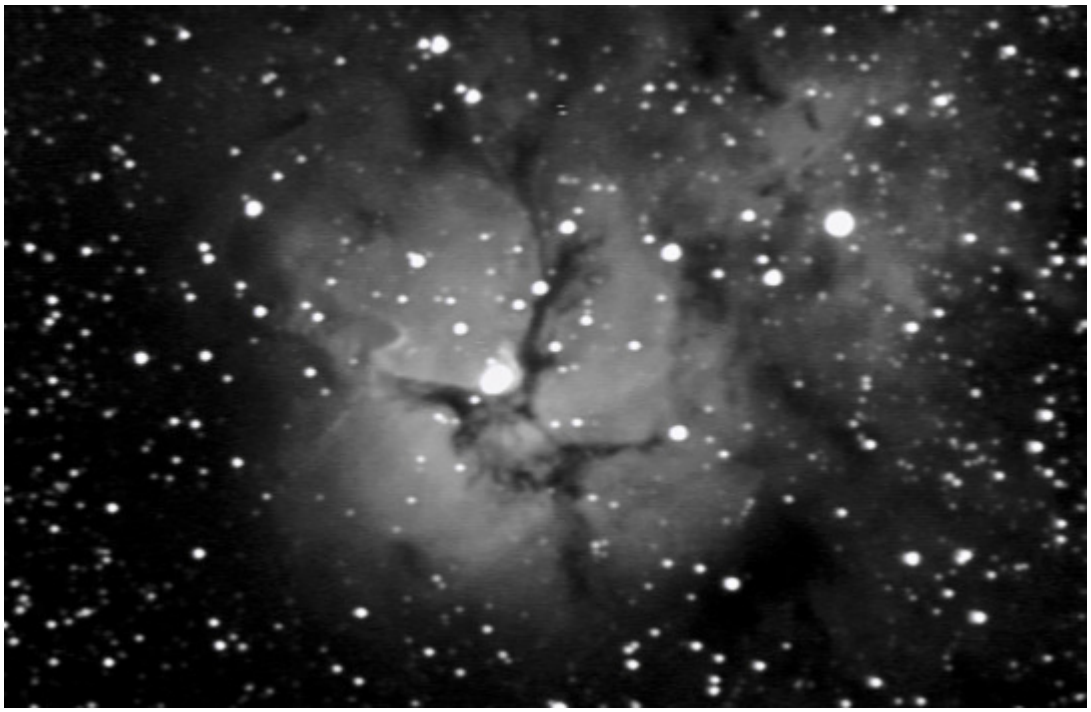
AVI Capture Tab


Capture Video From Stellacam or other Camera - Using Microsoft Direct Show
Full Screen Mode
Stopwatch
Video Settings
Video Capture Pin
Return Image To Main Window
Preview On
Video Preview Window
Current Captured Image
Setup
Still Capture
AVI Capture
Set Object Being Imaged
Use a descriptive name for your exposure. The AVI file created by this process will include this name. Then enter the exposure time and click Expose.
Take Exposure
Length :
Minutes
Seconds
Expose
Stop
Goto Capture Folder
TIP: Use AVI Capture when imaging solar system objects. Typically for these objects you want to record as many frames as possible so that your chances of getting great images are improved.
Close

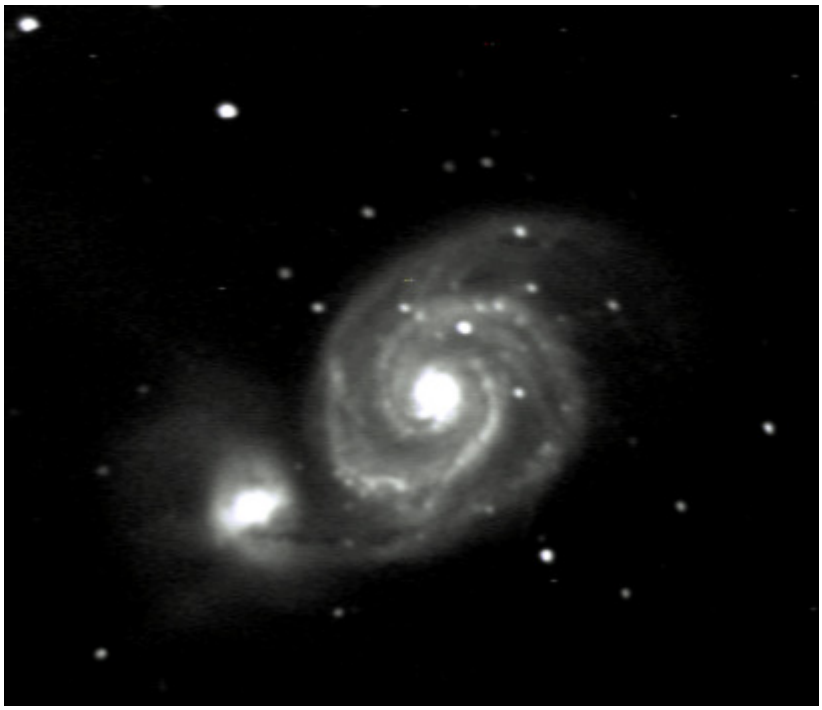
Use the AVI capture tab to capture video as an uncompressed AVI file. This is the preferred capture method for imaging solar system objects since you will most likely need many frames to get a good final image. Like in the still capture tab, specify a name of the object you are imaging. This will be used in the saved filename. Then enter in an exposure length in either seconds or minutes, and click the EXPOSE button. Images captured in this manner will eat up a lot of disk space since the capture is being done in uncompressed mode.

Sample of Images Taken with Stellacam III and Mallincam Cameras

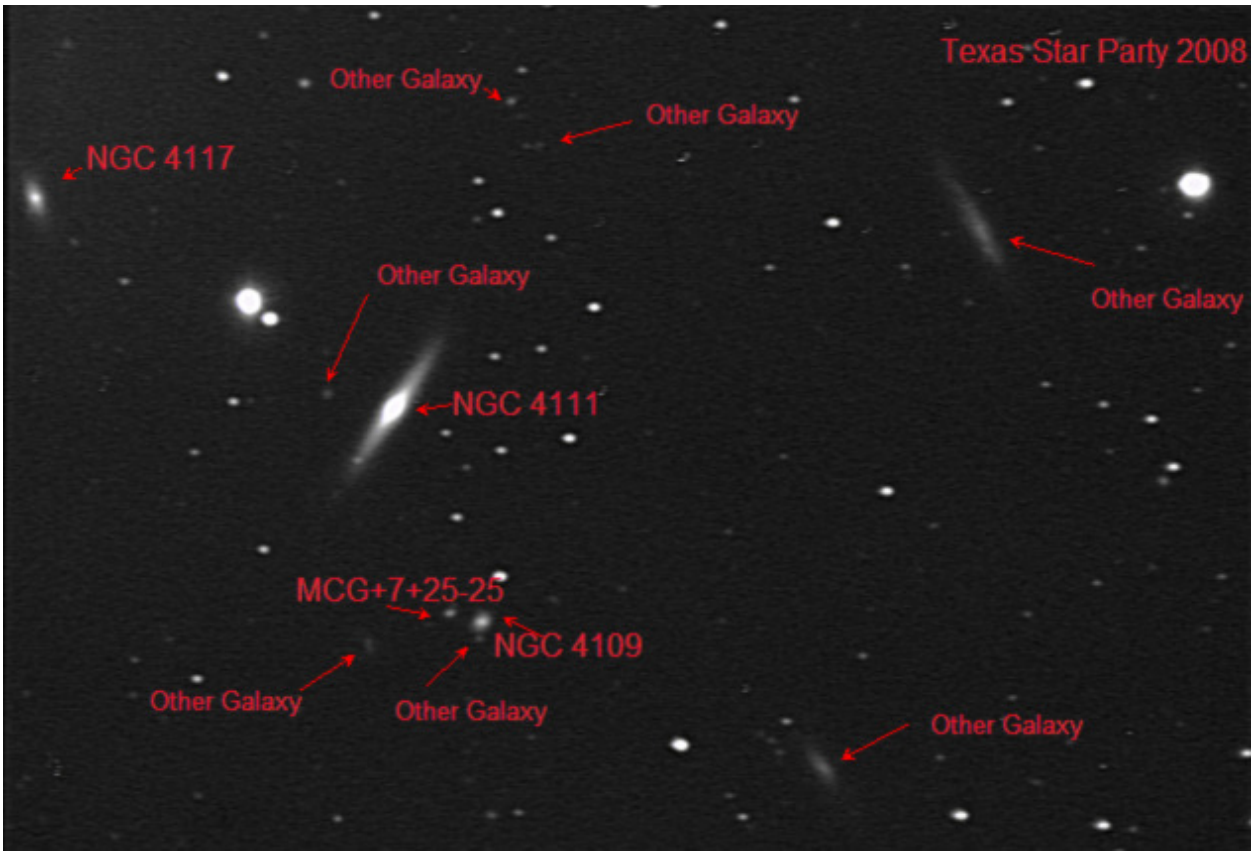
M27 - 8 combined images for 28 seconds each
M57 - 8 combined 28 seconds each
M76 - 8 combined 28 seconds
Uranus
Neptune
Mallincam Hyper Color
Sept 7, 2007
by Steve Tuma



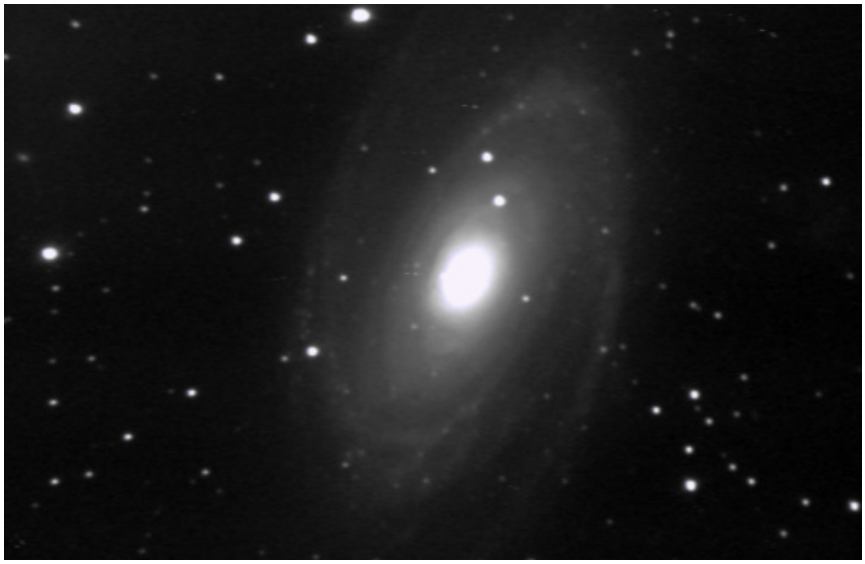
M20 using Stellacam III four 30 second exposures 12” RCX 400



M51 using Stellacam III single 60 second exposure 12” RCX 400



NGC 4111 and others using Stellacam III four 30 second exposures 12" RCX 400



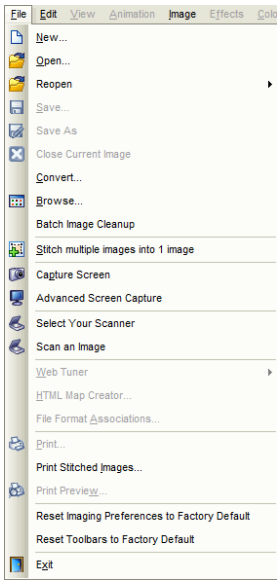
M81 using Stellacam III three 45 second exposures 12" RCX 400

Deepsky Imaging Tasks

Deepsky Imaging Tasks

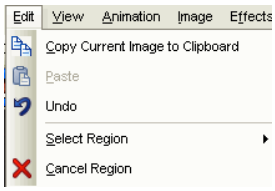
The following information gives you a summary of all of the options and features you have available to you in the software.

File Menu



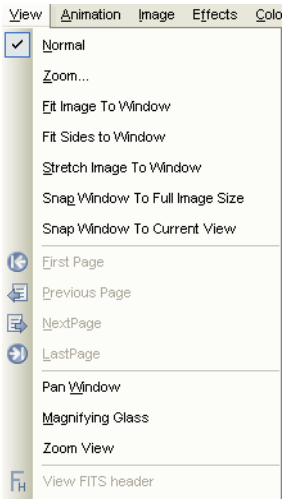
New	Start a new blank image according to the dimensions you choose.
Open	Open an image from your local or network drive
Reopen	Opens an image that was previously opened. This is a recent Image list.
Save	Save the currently displayed image to disk.
Save As	Save the currently displayed image to disk allowing you to select the format.
Close Current Image	Closes the current window
Convert	Image conversion program that converts images from one format to another. Batch conversion is available.
Browse	Browse a folder of images displaying the results in a thumbnail view.
Batch Image Cleanup	Processes a series of images for leveling, removing hot pixels, etc.
Stitch multiple images	Stitch multiple images together to make one larger image.
Capture Screen	Captures the current screen.
Advanced Capture	Captures the screen in a variety of ways including full, region, & desktop. Use F11 to initiate the capture.
Select Your Scanner	Selects a twain compatible scanner attached to your computer
Scan an Image	Scans an image or document into a new window in Deepsky Imaging
Web Tuner	Examine the effects of compression on an image so that you can optimize it for the Web.
HTML Map Creator	Allows you to create an HTML map of the image.
File Format Associations	Associates file formats with Deepsky Imaging.
Print	Print the image displayed in the current window.
Print Stitched Images	Prints several stitched images.
Print Preview	Preview the image before printing it.
Reset Imaging Prefer.	Resets all preferences in Deepsky Imaging to their default values.
Reset Toolbars	Resets the toolbars back to default settings.
Exit	Close Deepsky Imaging.

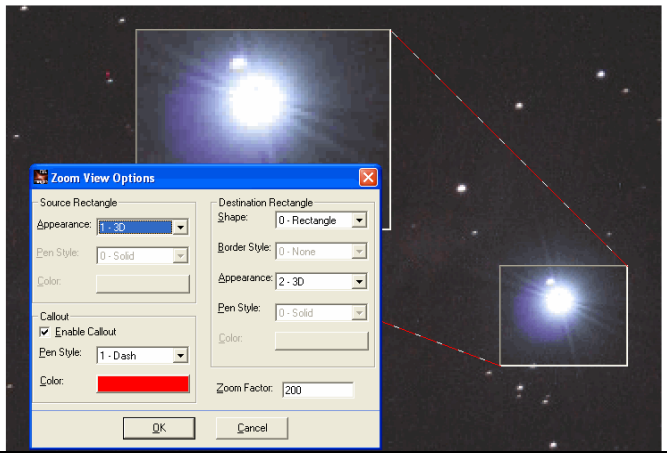
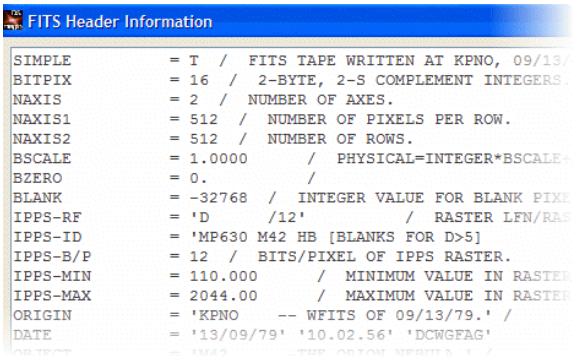
Edit Menu



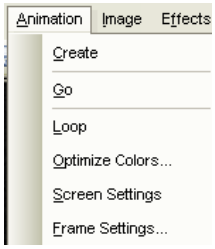
Copy Image to Clip board	Copies the current image to the Windows clipboard.
Paste	Pastes an image into a new window in Deepsky Imaging.
Undo	Cancels the last operation.
Select Region	Selects a region of the image. Subsequent image processing tasks will be applied to that region until the Cancel Region is selected.
Cancel Region	Cancels region processing.

View Menu



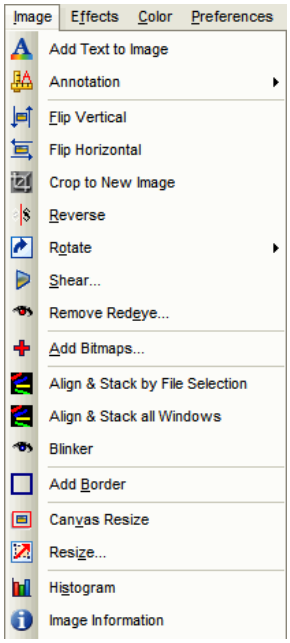
Normal	Displays the image at its actual size.
Zoom	Lets you Zoom into the image.
Fit Image to Window	Fits the image to the current window.
Fit Sides to Window	The largest possible width or height is set to the control's client area width or height. The remaining dimension is set proportionally to maintain the aspect ratio.
Stretch Image to Window	Width is the control's client area width. Height is the client area height. The aspect ratio is not preserved.
Snap Window to Full Image Size	Makes the size of the window equal to the image size.
Snap Window to Current View	Makes the size of the window equal to the image size the image is currently scaled at.
First Page, Previous Page, Next Page, Last Page	Used for navigation in multi paged images.
Pan Window	Displays a small pop up window showing the entire image with a rectangle of the current view that can be used to pan around the full image.
Magnifying Glass	Makes the mouse pointer appear as a magnifying glass. Left click to zoom in at the mouse position. Configurable in Program Options in Preferences.
Zoom View	Lets you create 1 or more magnified windows that can be dragged around the screen like with Pan Window. Zoom view is fully configurable and multiple zoom views can be active on a single image. 
View FITS header	View header information of the currently shown FITS image 

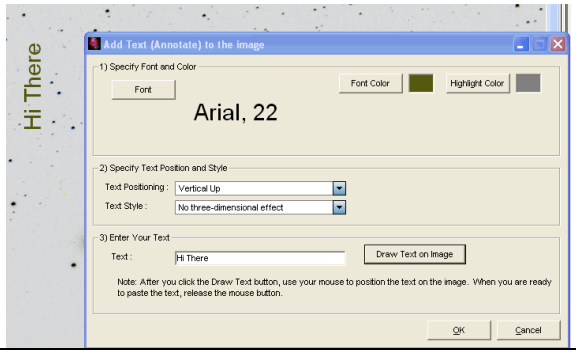
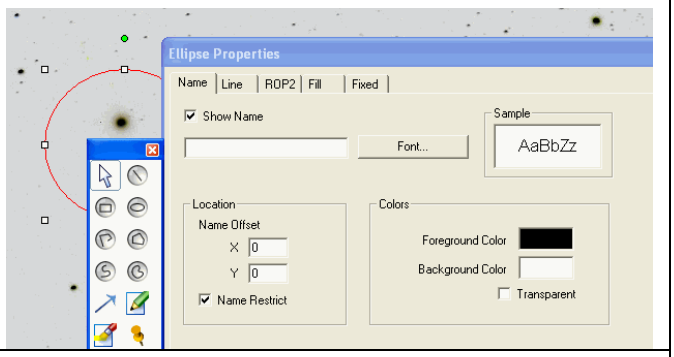
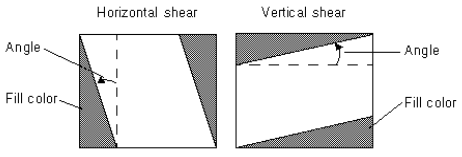
Animation Menu

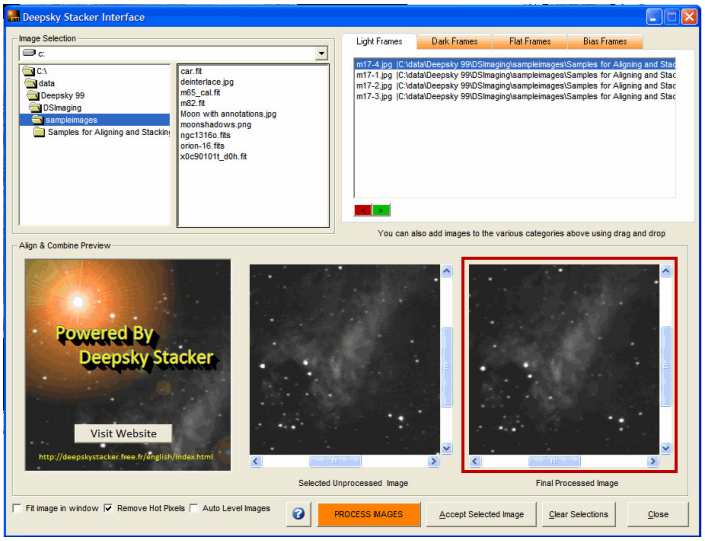
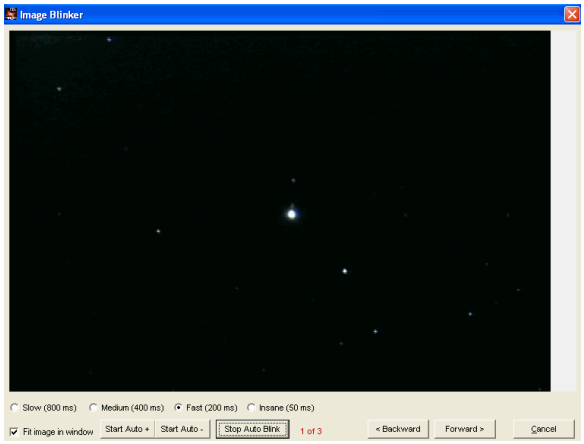


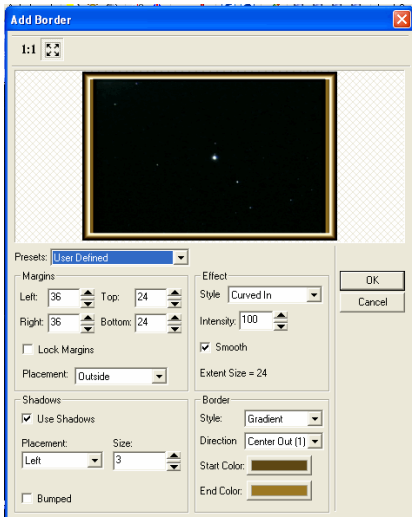
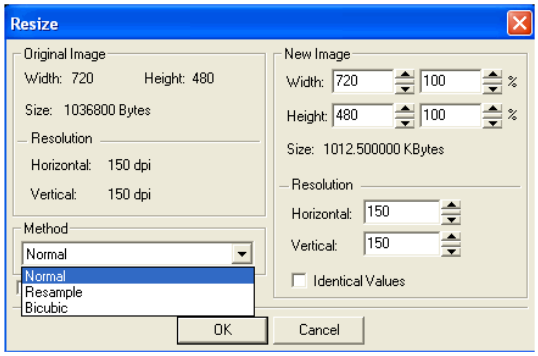
Create	Lets you specify the images for the animation
Go	Runs the animation.
Loop	Turns on LOOPING to make the animation run over and over.
Optimize Colors	Specifies the color resolution to use for the image.
Screen Settings	Specifies screen settings such as width and height to use.
Frame Settings	Specifies settings for the animation frame.

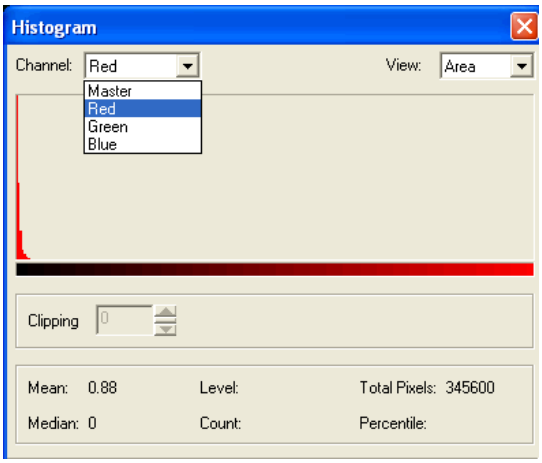
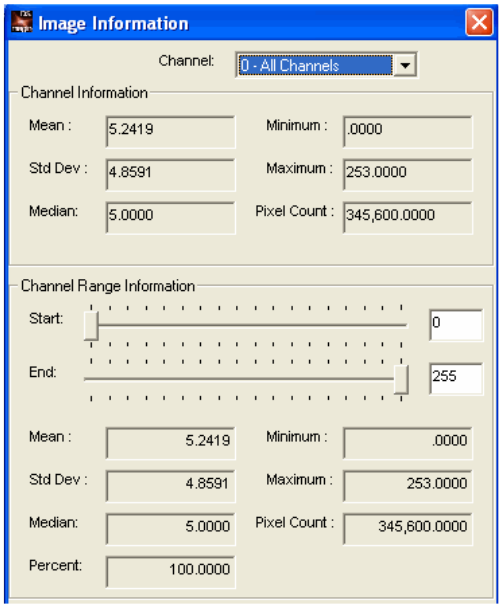
Image Menu



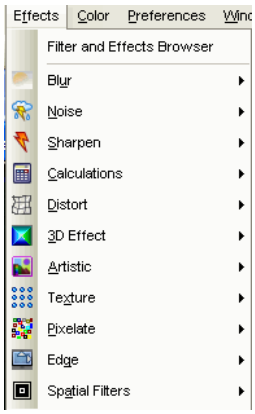
Add Text to Image	Easiest method to add text to an image. 
Annotation	This is a fully fledged annotation module that lets you have complete control over annotating images. You can draw lines, circles, highlight portions of the image, attach notes, hyperlinks, stamps, rulers, angle measurement, and more. 
Flip Vertical	Flips the image vertically.
Flip Horizontal	Flips the image horizontally.
Crop to new image	Lets you select a portion of the image and crop the image.
Reverse	Applies a mirror effect.
Rotate	Rotates the image using any angle.
Shear	Move the corners of the bitmap in the fashion of a parallelogram. 

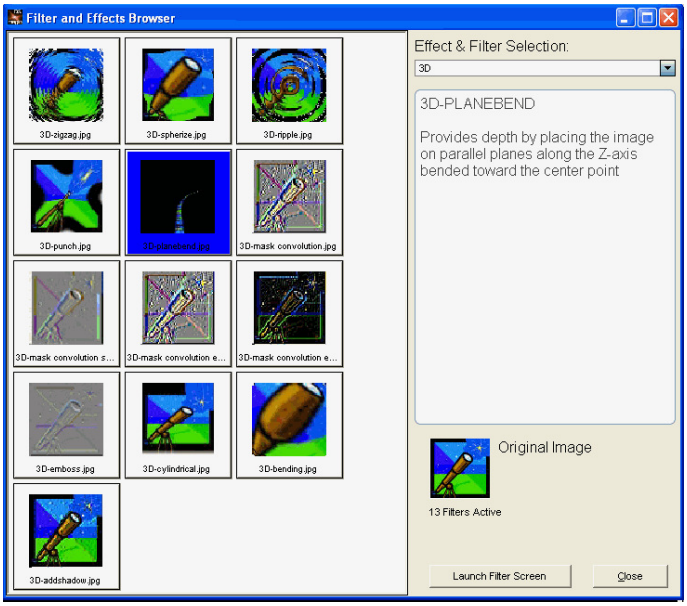
Remove Red-Eye	Removes the red eye effect on images of people.
Add bitmaps	Adds or averages 2 or more images. This operation can be used to add several images of the same view to improve the lightness or brightness of the image. It can also eliminate random noise contained in the images by averaging all bitmaps.
Align & Stack by file selection	Uses Deepsky Stacker software to align and stack your images. The following screenshot shows the results of aligning 4 images of M17.  To start the stacking process, click the *PROCESS IMAGES* button. Deepsky Stacker will display its command window showing you the progress. When finished, the final image will be shown in the *Final Processed Image* box.
Align & Combine all Windows	This does the same thing as the preceding alignment function, however only the MDI child windows that you have open will be used for alignment purposes. This saves you time from having to manually select each image. For both options you can still drag and drop images from file explorer if you want.
Blinker	This feature lets you load multiple images onto the screen so that you can compare “Blink” the images to see movement. The following screen shows 1 of 3 frames of the planet Uranus. You have the option of manually blinking the images or automatically blink them in a loop. 

Add Border	This feature lets you add a border around the current image. There are several predefined borders that you can use. 
Canvas Resize	Resizes the canvas the image is on.
Resize	Allows you to resize an image using several techniques. 

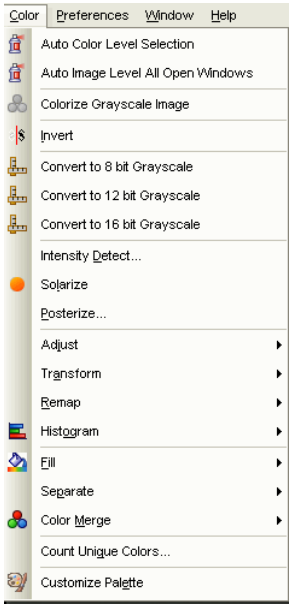
Histogram	Displays a histogram showing the various color channels. 
Image Information	Displays detailed information on the currently displayed image. 

Effects Menu



Filter and Effects Browser	The browser shows you an example of what the image will look like after you apply that effect. If you would like to use an effect to enhance your image, click on the thumbnail and then click *Launch Filter Screen*. 
Blur	Applies various blur effects to the image – Low pass (Guassian), Motion, Radial, Zoom, Anti-Alias, Average.
Noise	Adds noise effects to the image – Removes hot pixels, median, add noise, binary filter, and de-interlace.
Sharpen	Sharpens the image – Unsharp mask, sharpen, high pass filter.
Calculations	Applies mathematical calculations to the image – Math functions, Multiply, Subtract Background, Custom User Filter.
Distort	Applies distortion effects to the image – Freehand Wave, Wind, Polar, Zoom Wave, Radial Wave, Swirl, Wave, Wave Shear, Rev Effect, Ocean.
3-D	Applies 3-D effects to the image – Emboss, Mask Convolution, Punch, Ripple, Bending, Cylindrical, Spherize, Plane Bend, Zig Zag, Add Shadow.
Artistic	Applies artistic effects to the image – Impressionist, Oilify, Glow, Diffuse Glow, Dry, Colored Pencil, Cloud, Lens Flare, Pointillist, Color Replace, Glass, Vignette, Fragment.
Texture	Underlay other images onto the current image.
Pixelate	Applies pixilation effects to the image – Pixelate, Mosaic, Picturize
Edge	Applies edge effects to the image – Detect, Smooth Edges, Edge Detect Effect
Spatial Filters	Imposes a spatial filter on the bitmap. Spatial filters are used for operations such as sharpening an image or detecting edges within the image – Gradient, Laplacian, Sobel, Prewitt, Shift and Difference, Line Segment.

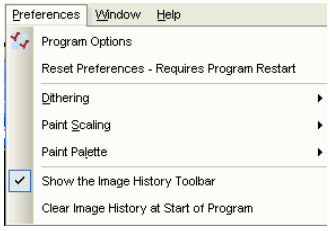
Color Menu



Auto Color Level Selection	This feature displays 4 images (Original, Auto Level, Auto Contrast, & Auto Intensity. You can then change the black and white sliders until you get the effect you like. Then select the image you want to use and click OK. This method makes the dark values darker and the light values lighter, which automatically enhances shadows and brightens the image. It also maximizes the tonal range of the image. It enhances the contrast and intensity using the image's histogram and a color distribution-based algorithm.
Auto Image Level All Open Windows	This option will go through the currently open windows and apply the AUTO LEVEL button found on the toolbar to each window.
Colorize Grayscale Image	Changes the distribution of the red, green, or blue channels. The method can be used as a visualization aid. More precisely, this method can be used to show variations in a bitmap's intensity values. This method colors the grayscale bitmap by converting specified ranges of grayscale intensities into corresponding RGB values.
Invert	Inverts the colors in the bitmap, making it like a photographic negative.
Convert to 8 bit Grayscale	Converts the current image to an 8 bit grayscale image.
Convert to 12 bit Grayscale	Converts the current image to a 12 bit grayscale image.
Convert to 16 bit Grayscale	Converts the current image to a 16 bit grayscale image.
Intensity Detect	Applies binary segmentation to a bitmap by filtering the specified bitmap to detect colors in a specified intensity range, in the specified color channel. The image is divided into 2 parts, inner and outer, according to the high/low values.
Solarize	Applies an effect that mimics the accidental exposure of photographic film to light. It does so by inverting all color data with an intensity value greater than or equal to the threshold that you specify.
Posterize	Imposes a poster effect on the bitmap by quantizing the bitmap's colors to a specified number of color levels per plane. For example, two levels means two of red, two of green, and two of blue.
Adjust → Auto Level Image	Performs the same function that the Auto Level toolbar button does.
Adjust →Brightness / Contrast Enhancement	Applies contrast, brightness, and intensity adjustments to enhance the image tonal range.
Adjust → Brightness	Adjust the brightness of the image only.
Adjust → Contrast	Adjust the contrast of the image only.
Adjust → Lighting	Lightens or darkens all or part of a bitmap by remapping the pixel values. This method remaps the pixel values of the bitmap across the full range of available pixel values, in order to achieve the values you set.
Adjust → Hue	Adjusts the hue of the image.
Adjust → Tint	Adjusts the tint of the image.
Adjust → Saturation	Adjusts the saturation of the image.
Adjust → Gamma	Adjusts the gamma.
Adjust → Balance Colors	Redistributes the RGB values of the specified bitmap, using the values stored in the specified structures.
Transform → Halftone	Converts image to a halftoned bitmap.
Transform →Increase / Decrease color resolution	Increases or decreases the resolution of an image to any bit depth.
Transform → Grayscale	Converts a grayscale bitmap into a colored one by mixing or replacing the original values of the pixels with one or more new colors.
Transform → Colored Gray	Converts a bitmap to a grayscale bitmap, then enhances the color components based on the specified parameters. This method can be used to give an image a "Sepia" look.

Remap → Intensity	This method uses a lookup table to change the bitmap's intensity values. You can apply the change to red, green, blue, or all color channels.
Remap → Hue	This method uses a lookup table to change a bitmap's hue values. This method can be used to change a range of colors to another range of colors. For example, it could be used to change all red pixels to any color, where a red pixel can have any brightness and any amount of white (saturation).
Histogram → Equalize	Linearizes the # of pixels in the bitmap, based on the specified color space. This can be used to bring out the detail in dark areas of an image.
Histogram → Stretch Intensity	Increases the contrast in a bitmap by centering, maximizing, and proportioning the range of intensity values.
Histogram → Contrast	Increases or decreases the contrast of the image in a bitmap, using a histogram to determine the median brightness. This method finds the median brightness of the image; then brightens the pixels with values above the median and darkens the pixels with values below the median.
Fill	Fills the entire image with the specified color.
Separate →RGB	Separates the bitmap by color plane to produce one grayscale bitmap per plane. Uses the RGB color space model.
Separate →CMYK	Separates the bitmap by color plane to produce one grayscale bitmap per plane. Uses the CMYK color space model.
Separate →HSV	Separates the bitmap by color plane to produce one grayscale bitmap per plane. Uses the HSV color space model.
Separate →HLS	Separates the bitmap by color plane to produce one grayscale bitmap per plane. Uses the HLS color space model.
Separate →CMY	Separates the bitmap by color plane to produce one grayscale bitmap per plane. Uses the CMY color space model.
Color Merge → RGB	Creates a color bitmap by merging grayscale bitmaps that were created as color separations using the RGB color space model.
Color Merge → CMYK	Creates a color bitmap by merging grayscale bitmaps that were created as color separations using the CMYK color space model.
Color Merge → HSV	Creates a color bitmap by merging grayscale bitmaps that were created as color separations using the HSV color space model.
Color Merge → HLS	Creates a color bitmap by merging grayscale bitmaps that were created as color separations using the HLS color space model.
Color Merge → CMY	Creates a color bitmap by merging grayscale bitmaps that were created as color separations using the CMY color space model.
Count Unique Colors	Counts the # of unique colors in the image.
Customize Palette	Customize the Palette.

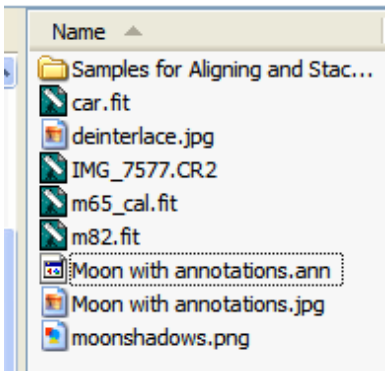
Preferences Menu



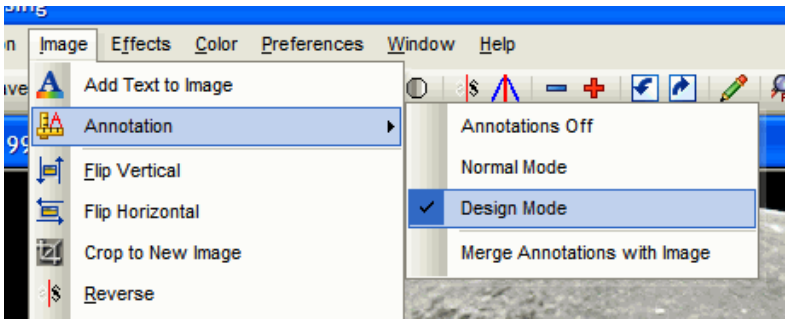
Program Options	Sets various options used in Deepsky Imaging.
Reset Preferences	Resets all preferences to their default values.
Dithering	Sets the dithering method to use on 8 bit images.
Paint Scaling	Sets the type of resizing to use when painting an image.
Paint Palette	Specifies whether to force use of a fixed palette when painting images on a device that displays 256 colors or less.
Show the Image History Toolbar	Specifies whether the image history toolbar is visible. This toolbar is used to maintain a history of all image changes, allowing you to get back to a prior state.
Clear Image History at Start of Program	When checked, the image history will be cleared when the program starts.

Annotations Summary

Deepsky imaging includes very robust annotation support for marking up your images. Annotations can be maintained separately from bitmaps or they can be merged onto the image. When you add an annotation to an image and save the file, a separate annotation file named the same as the image but with a .ANN file extension is created. Try opening the Moon with Annotations image in the sampleimages folder.

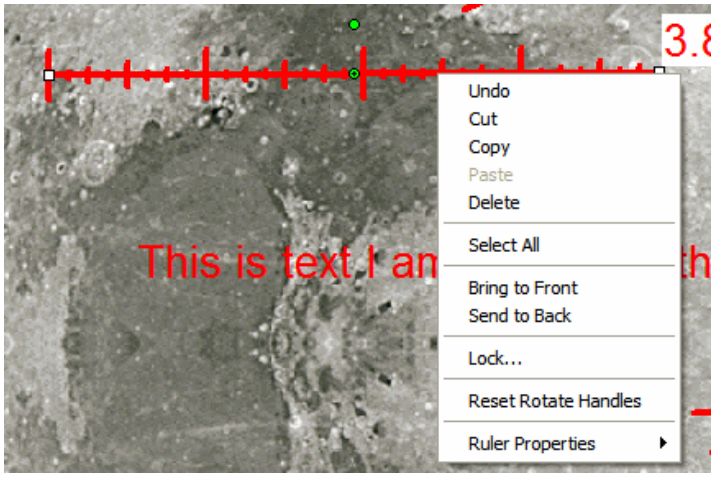


When the image opens, you will see the moon with a bunch of annotations on it. Initially when the image is first loaded, the annotation mode is NORMAL, which means you can't change the annotations. If you go into DESIGN mode, you will be able to edit the annotations. Remember, when you are in design mode, you can add or remove annotations. Make sure you switch to normal mode to ensure you don't inadvertently remove annotations.

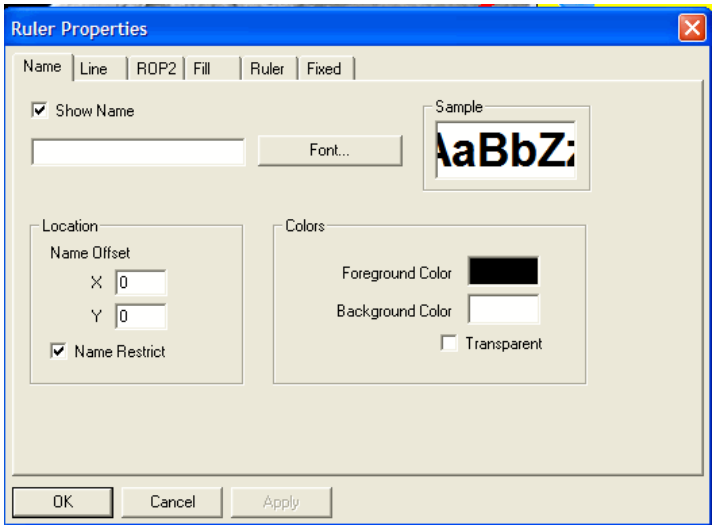


If you know that you will never change the annotations, you can use the MERGE ANNOTATION WITH IMAGE option to permanently place the markup onto the image. Once you do this, the annotations are gone and only the image remains.

Annotation Properties



When you are in design mode, each annotation has many properties that you can set to change the appearance of the annotation. Simply right click and select the properties (in the above example it's RULER PROPERTIES) and you will see a screen similar to the below screen.



One thing that may confuse you is when you want to change text of an annotation, do not change the NAME tab as shown above, but rather if text is available, a TEXT tab (not shown in the above example) will be shown.

Annotation Features

The following information was taken from the Lead tools help file and explains many of the annotation features available in Deepsky Imaging. LeadTools is the company that makes the imaging toolkit that Deepsky Imaging uses. If you are a software developer, I highly recommend their toolkits.

The following annotation features are available in Deepsky Imaging:

- New Rubber Stamp Display Style
- New XP Style Annotation Toolbar
- New Alpha Background Fill Option
- New Annotation Rotate Option
- New Annotation Side Handles
- New Annotation Multi-select
- New Annotation Cursors
- New ESC to Cancel
- New Calibrate Ruler Feature
- New Dot Dash Lines
- New Text Annotation Options

The following paragraphs describe each feature in more detail.

New Rubber Stamp Display Style

In previous versions of LEADTOOLS, you could draw any of 26 predefined rubber stamp annotations. While any of these metafiles can be changed, users have asked for more contemporary-looking defaults. LEADTOOLS has responded and developed new default images. The following figure displays a sample of the original style and the new style:

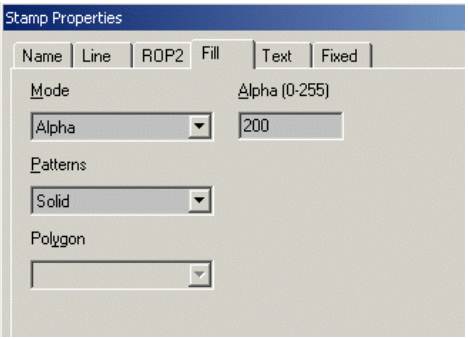
New XP Style Annotation Toolbar

The annotation toolbar has been updated to have a Windows-XP look and feel. The following figure displays a sample of the original style and the new style toolbar:

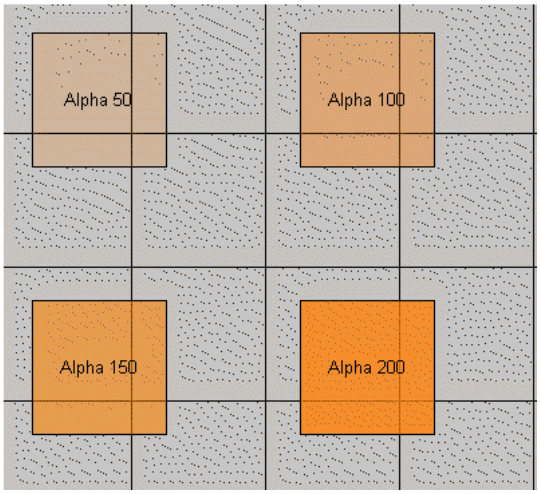
New Alpha Background Fill Option:

Previous versions of LEADTOOLS supported annotations with translucent backgrounds. With version 14.5, there is an alpha option that allows you to specify an alpha value from 0 (completely transparent background) to 255 (completely opaque background) inclusive.

When enabled, you can right-click an annotation object to display the Fill dialog with the new alpha option. Here you can enter an alpha value from 0 – 255 inclusive. The following figure displays the Fill dialog for the Stamp object:



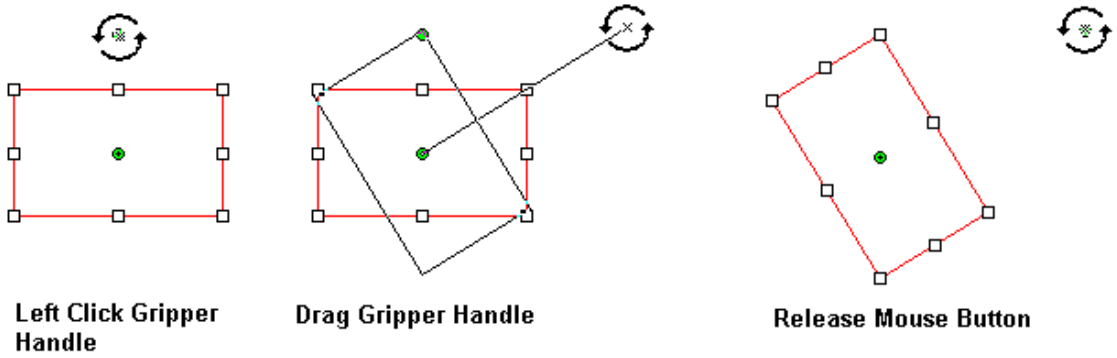
The following figure displays rectangle annotation objects using different alpha values:



New Annotation Rotate Option

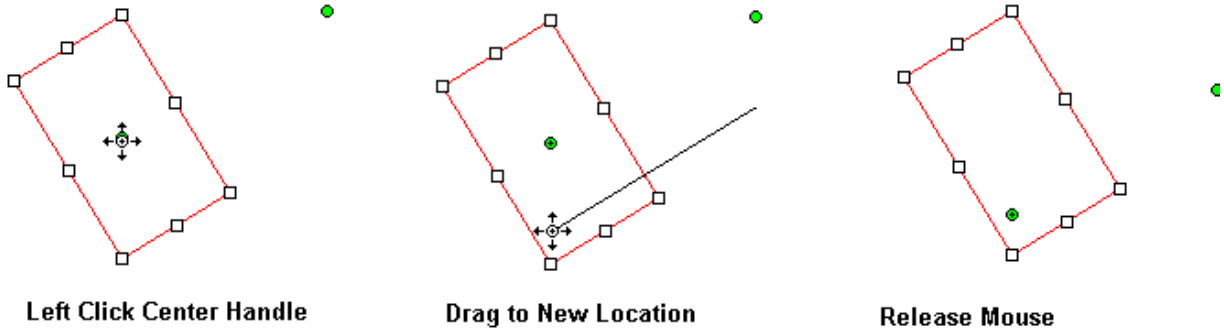
In previous versions of LEADTOOLS, annotation objects could be rotated by holding the <SHIFT> key while dragging a handle. With the new rotate options, two rotate handles are displayed on a selected object. One of the handles is the "gripper" handle, which rotates the object when dragged. The other handle is the "center" handle, which determines the center of rotation. The center of rotation can be moved by dragging. The gripper handle can be moved anywhere by dragging.

The following figure illustrates a rotate by dragging the "gripper" handle:

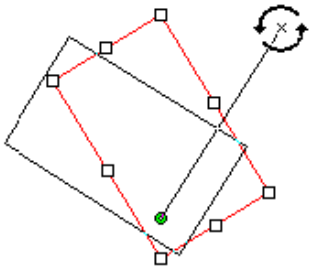


Left Click Gripper Handle **Drag Gripper Handle** **Release Mouse Button**

The following figure illustrates moving the "center" handle:

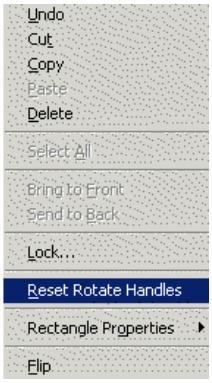


Left Click Center Handle **Drag to New Location** **Release Mouse**

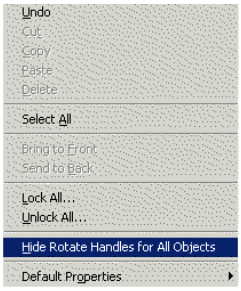


Rotate Around New Center

The rotate handles can be reset to a default location by right-clicking the annotation object, and selecting the Reset Rotate Handles option, as shown in the following figure:



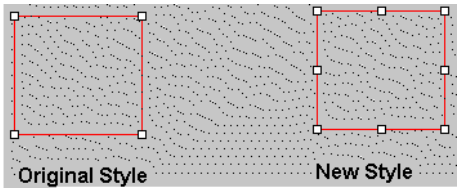
The rotate handles can be globally hidden or displayed by right-clicking on the image (not an annotation object), and selecting the Hide Rotate Handles For All Objects option, as shown in the following figure:



New Annotation Side Handles

In previous versions of LEADTOOLS, rectangular annotation objects were displayed with four handles to manipulate the object. With this new feature, rectangular objects are displayed with four additional side handles. Dragging the side handles resizes the annotation object only in one dimension. Dragging the corner handles resizes the object in two dimensions, preserving the aspect ratio.

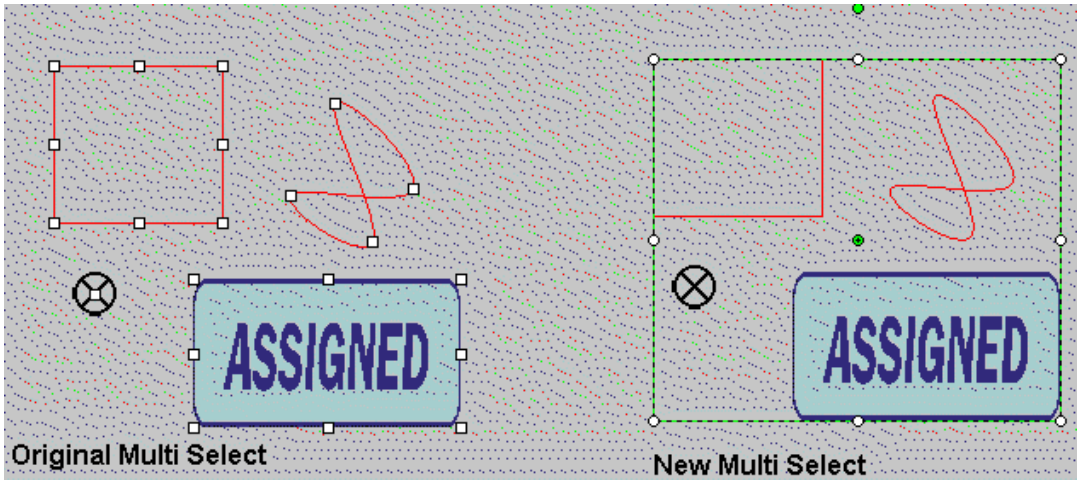
The following figure displays a sample of the original style and the new style:



New Annotation Multi-select

In previous versions of LEADTOOLS, you could select multiple objects and manipulate the objects by dragging any handle of any object. When moving a handle, the results were often not intuitive. With the new multi-select option, all selected objects are outlined with a *multi-select border*. The multi-select border has eight resize handles, and two rotate handles. Now, moving, resizing, and rotating multiply select objects is clear and easy to do.

The following figure displays a sample of the original style and the new style:

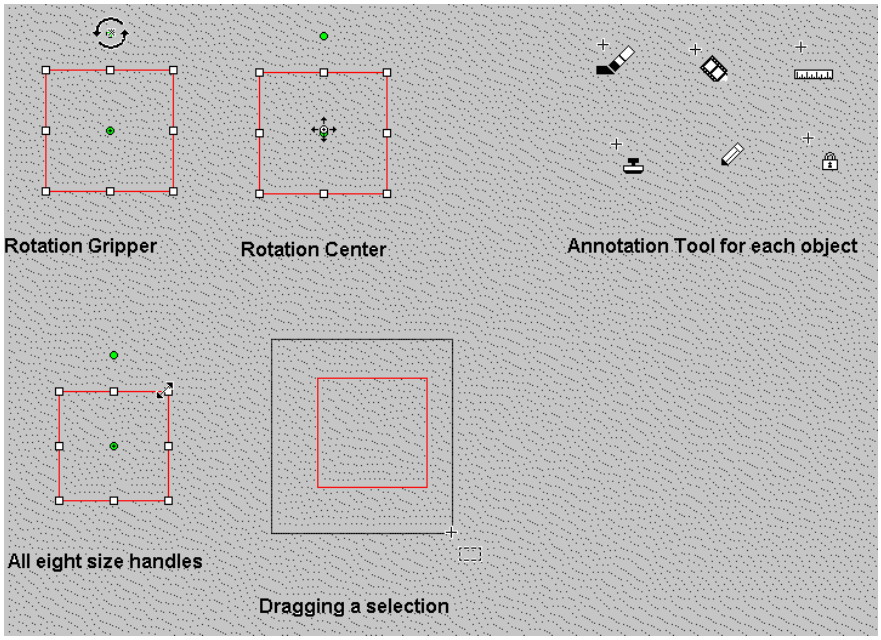


New Annotation Cursors

This new feature displays different cursors for many tasks in automated annotation mode. This feature displays unique annotation cursors in the following situations:

- When hovering over a rotation gripper handle
- When hovering over a rotation center handle
- When hovering over any of the eight size handles—an appropriate arrow cursor is displayed depending on the handle and the rotation of the annotation object.
- When dragging a selection
- When using any of the 30 annotation tools.

The following figure displays some of the new cursors:



New ESC to Cancel

In previous versions of LEADTOOLS, the ESC key was not set to cancel actions in annotation automation mode. With this new feature, a user can press the ESC key to cancel many actions in annotation automation mode. For example, when drawing an annotation, pressing ESC will cancel the annotation completely. When rotating, resizing, or moving an annotation, pressing ESC will cancel the action leaving the annotation unchanged.

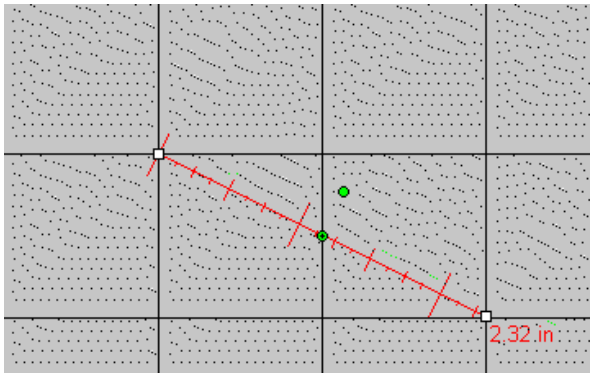
New Calibrate Ruler Feature

With this feature, a user can automatically calibrate a ruler to the desired size. This is useful when a user wants to interactively measure something in an image. Note that there are four annotations objects used for measuring:

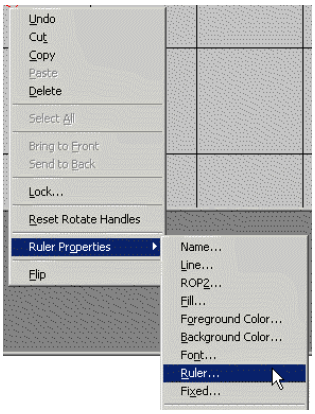
- ANN_OBJECT_RULER
- ANN_OBJECT_POLYRULER
- ANN_OBJECT_CROSSPRODUCT
- ANN_OBJECT_PROTRACTOR

Any of these objects can be calibrated. To calibrate a ruler:

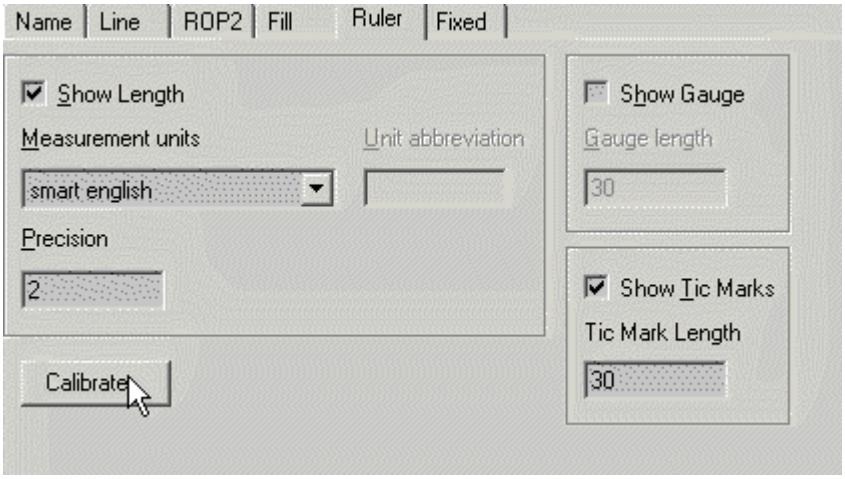
1. Load desired image
2. Draw an ANN_OBJECT_RULER object and size to desired size. In this example, we will calibrate the diagonal to be 2 feet. The following figure displays an uncalibrated ruler:



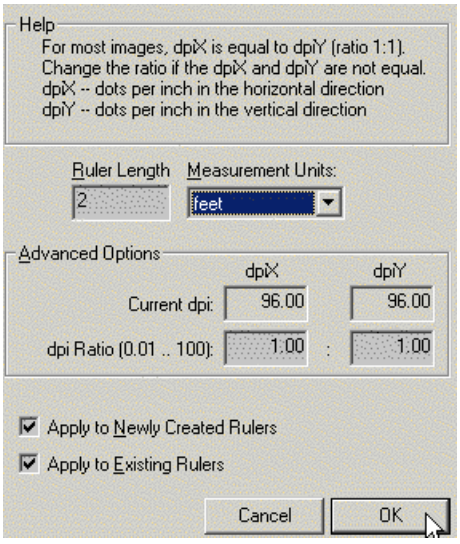
3. Right-click the ANN_OBJECT_RULER object and select *Ruler Properties*, and then *Ruler,* as shown in the following figure:



The following figure appears:



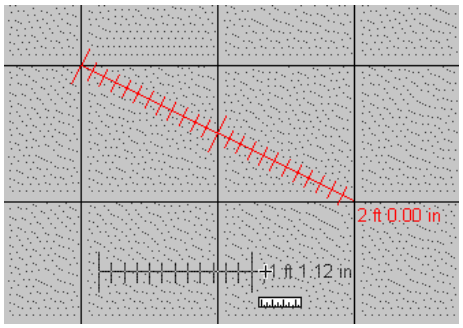
4. Click the Calibrate button to open the Calibrate Ruler dialog. The following figure displays:



In the Calibrate dialog, set the *Ruler Length* to 2 and the *Ruler Measurement* to feet. Select the *Apply to Newly Created Rulers* check

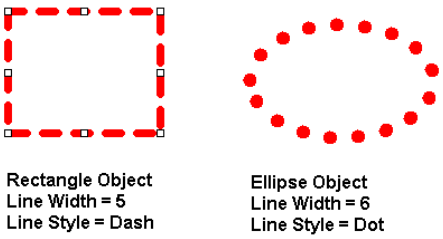
box. Click the OK button to close the Calibrate dialog. Click the OK button to save your selections and close the Ruler Properties dialog.

5. Draw a new ruler to measure any part of the image, as shown in the following figure:



New Dot Dash Lines

Most of the LEAD annotation objects have a *Line Width* and *Line Style* option. This can be used to draw the annotations with thick lines, and change the line style from solid to dashed or dotted. In previous versions of LEADTOOLS, drawing annotations with thick lines (line width more than 1 pixel) required that the line style be *Solid*. This is due to a limitation of Windows GDI. In version 14.5, this limitation has been removed. Now annotation objects can be drawn with thick lines of *any* style. The following example illustrates this:



New Text Annotation Options

For the following text-based annotations, you can now change the text color so that it is different from the border color. Also, you can optionally show or hide the text.

- ANN_OBJECT_TEXT
- ANN_OBJECT_TEXTPOINTER
- ANN_OBJECT_STAMP
- ANN_OBJECT_NOTE
- ANN_OBJECT_PUSHPIN

For the following text based annotations, you can now optionally show or hide the border.

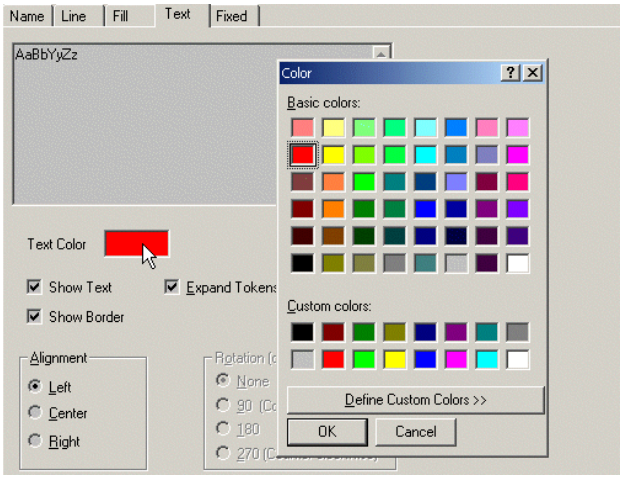
- ANN_OBJECT_TEXT
- ANN_OBJECT_STAMP

These properties can also be set for the following annotation objects for purposes of recursion:

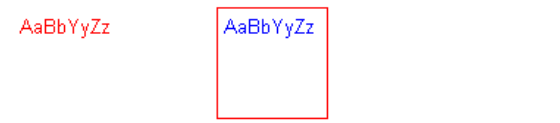
- ANN_OBJECT_CONTAINER
- ANN_OBJECT_AUTOMATION
- ANN_OBJECT_BUTTON

To see these new features:

1. Draw an ANN_OBJECT_TEXT object
2. Right-click the object
3. Select *Text Properties* and then *Text*
4. In the *Text* dialog, select the *Show Border* check box
5. Click the *Text Color* button to change the color to blue. The following figure displays the Text dialog:



6. The following figure displays the original text object before and after changing the text color to blue:



Original Text Annotation

After changing Text Color and Show Border options

Annotation Tools Available

The following tools are available on the annotation toolbar when you are in design mode.

Audio Clip Tool

The audio clip annotation object is a rectangle containing a scaled image that can be activated to play a WAV file. In design mode, you can click and drag to specify the rectangle in the current window. A dialog box then lets you specify the WAV file. In run mode, clicking on the icon plays the WAV file.

In design mode, you can click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Select a WAV file to load into the object.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Button Tool

The button annotation object is an image of a standard Windows button that can be activated. In design mode, you can click and drag to specify the size of the button in the current window. A dialog box then lets you enter the text for the button.

In design mode, you can then click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.

- Lock and unlock annotation objects.
- Change the Name properties.
- Change the fill mode.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Note: Only certain font characteristics can be changed for the button tool.
- Edit the text.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Cross Product Tool

The CrossProduct annotation object consists of two simple lines intersecting at right angles. With the automated functions, the CrossProduct is started on a mouse-down event and completed on a mouse-up event. Holding down the Shift key while drawing the CrossProduct will make the CrossProduct annotation square.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the fill mode.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Change the measurement units, precision and gauge length. Set show flags
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Closed Curve Tool

The closed curve annotation object (ANN_OBJECT_CURVECLOSED) is a sequence of points that are joined by cubic polynomials such that adjacent polynomials are continuous at the first and second

derivates. Unlike the curve annotation object, the first and last endpoints are also joined by a curve. The result is a smooth, continuous closed curve going through all the points.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- (If the object has multiple nodes) Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operations (ROP2) code.
- Change the fill mode and the fill pattern.
- Change the polygonal fill mode, which controls which areas are filled when lines cross.
- Change the foreground and background colors.
- Change the node properties.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Curve Tool

The curve annotation object is a sequence of points that are joined by cubic polynomials such that adjacent polynomials are continuous at the first and second derivates. The result is a smooth, continuous curve going through all the points.

In design mode, each curve is formed with a mouse click, and the object is completed on a double click.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.

- (If the object has multiple nodes) Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the foreground color.
- Change the node properties.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Ellipse Tool

The Ellipse annotation object is a simple ellipse. In design mode, click and drag to specify the ellipse in the current window. Holding down the Shift key while drawing the ellipse will make the ellipse annotation circular.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the fill mode and the fill pattern.
- Change the foreground and background colors.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Encrypt Tool

The encrypt annotation object is a rectangular object that is used to encrypt rectangular portions of a bitmap. It can also be used to encrypt the entire bitmap.

In design mode, the Encrypt object is created by selecting the Encrypt tool and then clicking and dragging the mouse to create the rectangular Encrypt object. Then while the object is selected, right-click the object and select the Encrypt item on the Encrypt Properties menu, enter the key in the Encrypt Properties dialog that appears, and then click **Apply**. In design mode, the Encrypt object is visible but partially transparent to show the part of the bitmap that it covers.

In run mode, the encrypt object is invisible. In run mode, if an encrypt object (state encryptor) has been applied to the bitmap, the pixels underneath the encryptor's location are physically scrambled in a manner that depends upon the key used when the encrypt object was created.

An encrypt annotation has two metafiles--one for when it is an encryptor, and one for when it is a decryptor.

The encryptor metafile is changed with the **Metafile** option.

The decryptor metafile is changed with the **Secondary Metafile** option

If you have one or more encrypt objects selected and you change the "Metafile" then the encryptor metafile changes for all of the selected encrypt objects.

You can also change the metafile and secondary metafiles for all newly created encrypt objects by right-clicking on the image (but not on an annotation), selecting **Default Properties** and changing the primary/secondary metafiles.

Overlapping regions can be encrypted. When encrypting overlapping regions, note the following points:

- All annotation objects have an order in which they are drawn (the Z-order).
- The encryptors are encrypted from the front of the Z-order to the back.
- Those that are drawn first are encrypted first. Those that are drawn last ("on top" of other encryptors) are encrypted last.
- The Z-order can be changed through automation by right-clicking and choosing "Send To Front" or "Send To Back".
- The decryptors are decrypted in reverse order of the encryptors.

Once applied, the portion of the bitmap under the encrypt object becomes scrambled, and the encrypt object changes state to become a decryptor. Using different keys before calling this function gives different scrambling patterns the decryptor state differs from the encryptor state in that a decryptor cannot be moved, and cannot be changed to an encryptor. The scrambling can be removed by calling AnnEncryptApply on the decryptor with the appropriate arguments. If successful, the decryptor state

changes to encryptor. An encrypt object in that encrytpor state can be moved, can have its key changed, and can be changed to a decryptor.

The encrypt object is useful for encrypting portions of a bitmap. After encrypting, the scrambled bitmap cannot easily be unscrambled without the associated annotation file. The scrambling can be removed by using the associated annotation file, or by using automation mode to manually change the encryptor to a decryptor, position it correctly, and setting the key appropriately.

When a bitmap that has had portion(s) of the bitmap encrypted is saved, the encryption information is saved with the rest of the annotation information in the associated annotation information file.

Polyruler Tool

The polyruler annotation object is an array of points that create a sequence of joined rulers. In design mode, each line segment is formed with a mouse click, and the object is completed on a double click.

The polyruler can be used to measure the distance of an irregularly shaped object. As ruler segments are added, removed, or changed in length, a running total of the total distance is displayed.

Holding down the Shift key while drawing the rulers will draw the rulers at an angle that is a multiple of 45 degrees.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- (If the object has multiple nodes) Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the fill mode.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Change the measurement units, precision and gauge length.
- Change the node properties.
- Change the fixed state.

- Set and manage hyperlink properties for an object or group of objects.

Rich Text Tool

The Rich Text annotation object is a rectangle containing text that supports Rich Text Format (RTF).

In design mode, click and drag to specify the rectangle in the current window. Holding down the Shift key while drawing the rectangle will make the text annotation square. A dialog box then lets the user enter the text. A menu also appears to allow further formatting of text. Formatting support includes:

- Font
- Font size
- Bold
- Italic
- Underline
- Foreground Color
- Background Color
- Bullets
- Numbering
- Indenting
- Alignment

As soon as the Text object is created, the text will be highlighted. The text may be edited immediately. While in design mode double click on a text object to edit the text.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the foreground color.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Freehand Hot Spot Tool

The freehand hot spot annotation object is an array of points that create a sequence of joined lines. With the automated functions, in design mode, each line segment is formed with a mouse move when

the left button is down, and the object is completed on a mouse up. In run mode, the object is transparent, but the mouse pointer changes to a hand when it is over the object.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- (If the object has multiple nodes) Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Change the name.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the node properties.
- Select a metafile to load into the Freehand Hotspot.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Freehand Line Tool

The freehand line annotation object is an array of points that create a sequence of joined lines. In design mode, each line segment is formed with a mouse move event when the left button is down, and the object is completed on a mouse up event.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- (If the object has multiple nodes) Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Change the Name properties.
- Change the line width and style properties.

- Change the binary raster operations (ROP2) code.
- Change the foreground color.
- Change the node properties.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Highlight Tool

The highlight annotation object is a rectangle with default properties that are appropriate for highlighting an area. In design mode, you can click and drag to specify the rectangle in the current window.

You can then click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects. See Password Dialog Box for Annotations.
- Change the Name properties. See Name Dialog Box for Annotations.
- Change the background color. See Color Dialog Box for Annotations.
- Change the fixed properties. See Fixed Dialog Box for Annotations.
- Set and manage hyperlink properties for an object or group of objects.

Hotspot Tool

The HotSpot annotation object is a rectangle that can be activated for an application-defined purpose. In design mode, the rectangle contains a scaled image. Click and drag to specify the rectangle. Holding down the Shift key while drawing the hot spot will make the HotSpot annotation square. In run mode, the object is transparent, but the mouse pointer changes to a hand when it is over the object. In run mode, clicking on the button triggers an event LtAnnEvent. You can add code to process the event. (The example program merely pops up a message box.)

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.

- Lock and unlock annotation objects.
- Change the Name properties.
- Select a metafile to load into the stamp.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Line Tool

The Line annotation object is a simple line. In design mode, the line is started on a mouse-down event and completed on a mouse-up event. Holding down the Shift key while drawing the line will draw the line at an angle that is a multiple of 45 degrees.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the default Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the foreground color.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Note Tool

The Note annotation object is a rectangle with a shadow border and color background (yellow by default). It contains a character string with font properties. The text will wrap on word breaks within the object's specified rectangle. In design mode, click and drag to specify the rectangle in the current window. Holding down the Shift key while drawing the note will make the Note annotation square. A dialog box then lets the user enter the text.

As soon as the Note object is created, the text will be highlighted. The text may be edited immediately. While in design mode double click on a text object to edit the text.

As soon as the Note object is created, the text will be highlighted. The text may be edited immediately. While in design mode double click on a note object to edit the text.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Edit the text.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Point Tool

The hot spot annotation object (ANN_OBJECT_POINT) is single point. With the automated functions, in design mode, each point is formed with a mouse click.

In design mode, you can click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Paste the object.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the name properties.
- Change the line properties.
- Change the ROP2 properties.
- Make the point transparent or not transparent.
- Change the transparent color.
- Select a bitmap file.
- Change the point properties.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.
- Flip the object.

Pointer Tool

The Pointer annotation object is defined by two points, with the an arrow at the first point. In design mode, click and drag to specify the points in the current window. Holding down the Shift key while drawing the pointer will draw the pointer annotation object at an angle that is a multiple of 45 degrees.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operations (ROP2) code.
- Change the foreground color.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Polygon Tool

The Polygon annotation object is an array of points that define the vertices of a polygon. In design mode, each line segment is formed with a mouse click, and the object is completed on a double click, which closes the polygon with a line from the last point to the first point.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Change the Name properties.

- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the fill mode and the fill pattern.
- Change the polygonal fill mode, which controls which areas are filled when lines cross.
- Change the foreground and background colors.
- Change the node properties.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Polyline Tool

The Polyline annotation object is an array of points that create a sequence of joined lines. In design mode, each line segment is formed with a mouse click, and the object is completed on a double click.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- (If the object has multiple nodes) Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the foreground color.
- Change the node properties.
- Change the fixed properties.
- (If the object has multiple nodes) Add or delete nodes. Add a node by clicking on the spot where you wish to add a node, then select Add Node. To delete a node, click on the node you wish to delete and select Delete Node.
- Set and manage hyperlink properties for an object or group of objects.

Protractor Tool

The Protractor annotation object (ANN_OBJECT_PROTRACTOR) consists of two simple lines joined at a vertex to create an angle. With the automated functions, the first line of the protractor is started on a

mouse-down event and completed on a second mouse-down event. The second line is completed on a third mouse-down event. Holding down the Shift key while drawing either of the two lines will draw the line at an angle that is a multiple of 45 degrees.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the fill mode.
- Change the foreground and background colors.
- Change the measurement units, precision and gauge length. Set show flags
- Set the protractor options.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Push Pin Tool

The PushPin annotation object (ANN_OBJECT_PUSHPIN) is a rectangle containing a scaled image that can be activated to show a hidden note. With the automated functions, in design mode, the user clicks and drags to specify the rectangle in the current window. Holding down the Shift key while drawing the PushPin will make the PushPin annotation square. A dialog box then lets the user specify the preferred options. In run mode, clicking on the icon display the hidden note.

A PushPin object has a primary bitmap, (manipulated using the AnnSetBitmap method and the AnnGetBitmap method) when the text is shown, and a secondary bitmap, changed using the AnnPredefinedRaster property. The primary bitmap is shown with the note text. The secondary bitmap is shown by itself when the note is minimized.

In design mode, the PushPin object shows the text and displays the primary bitmap. In run mode, the object shows/hides the text when clicked.

As soon as the PushPin object is created, the text will be highlighted. The text may be edited immediately. While in design mode double click on a PushPin object to edit the text. To get out of edit mode:

- Press escape. This cancels the changes.
- Press Ctrl-Enter. This accepts the changes.
- Click outside the edit box. This accepts the changes.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Edit the text.
- Set the primary and secondary bitmaps.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Rectangle Tool

The Rectangle annotation object is a simple rectangle. In design mode, click and drag to specify the rectangle in the current window. Holding down the Shift key while drawing the rectangle will make the rectangle annotation square.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the fill mode and the fill pattern.
- Change the foreground and background colors.

- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Redaction Tool

The Redaction annotation object is a rectangle with default properties that are appropriate for blacking out an area. In design mode, click and drag to specify the rectangle in the current window. Holding down the Shift key while drawing the rectangle will make the Redaction annotation square.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the background color.
- Set and manage hyperlink properties for an object or group of objects

Rubber Stamp Tool

The rubber stamp annotation object is a stamp object that has a metafile. For more information about the stamp tool, refer to Stamp Tool.

Ruler Tool

The ruler annotation object is a line that can be used to measure the distance between two points of the original image.

In design mode, you can click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.

- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operation (ROP2) code.
- Change the fill mode.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Change the measurement units, precision and gauge length. Set the show flags.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Selection Pointer Tool

The selection pointer is the mouse pointer for selecting and manipulating annotation objects in design mode.

With the selection pointer, you can select one or more objects as follows:

- You can select a single object by clicking on the object.
- You can click and drag to form a rectangular selection area that will select all objects that are completely contained within it.
- You can hold down the shift key and click on several objects one-at-a-time to select them all.
- Change the fixed properties.

When an object is selected, handles appear on the corners of its bounding rectangle. You can click on the body of the object and drag it to another position. You can click on a handle and drag to resize the object. If more than one object is selected, all of them are moved or resized.

In addition, you can use this pointer to rotate an object. If you hold down the shift key, click on a handle, and drag the mouse, the object rotates. If more than one object is selected, all of them are rotated, using the center of the group as the center of rotation. You cannot rotate a note, button, or audio clip. If you rotate a group that includes one of these objects, the object will move to the new position, but will retain its orientation.

The popup menu is also affected if more than one object is selected. In that case, when you click the right mouse button, the popup menu lets you change the properties of all the selected objects, and it lets you delete all the selected objects.

Stamp Tool

The Stamp annotation object (ANN_OBJECT_STAMP) can be a bitmap image, a metafile, or a text string in a rectangular frame. Only one of these three can be displayed at any time—setting the object to one

of these destroys any settings for the other two. Initially, the ANN_OBJECT_STAMP displays text. In design mode, click and drag to specify a rectangle. Holding down the Shift key while drawing the rectangle will make the Stamp annotation square. Then, if a text string is specified, the text is centered in the rectangle. If a bitmap or metafile is specified, the bitmap or metafile is scaled to fit the rectangle.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the line width and style properties.
- Change the binary raster operations (ROP2) code.
- Change the fill mode and the fill pattern.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Edit the text.
- Select an image file to load into the stamp.
- Select a metafile to load into the stamp.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Text Tool

The Text annotation object is a rectangle containing a character string with font properties. The text will wrap on word breaks within the object's specified rectangle. In design mode, click and drag to specify the rectangle in the current window. Holding down the Shift key while drawing the rectangle will make the text annotation square. A dialog box then lets the user enter the text.

As soon as the Text object is created, the text will be highlighted. The text may be edited immediately. While in design mode double click on a text object to edit the text.

As soon as the Text object is created, the text will be highlighted. The text may be edited immediately. While in design mode double click on a text object to edit the text.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.

- Delete the object.
- Select all objects.
- Bring the object to the front or send it to the back.
- Lock and unlock annotation objects.
- Change the Name properties.
- Change the fill mode.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Edit the text.
- Change the fixed properties.
- Set and manage hyperlink properties for an object or group of objects.

Text Pointer Tool

The text pointer annotation object (ANN_OBJECT_TEXTPOINTER) is a rectangle with a line that starts from one of the four corners. The other endpoint of the line can be moved to point to anything on the underlying image. The rectangle contains a character string with font properties. The text will wrap on word breaks within the object's specified rectangle.

In design mode, click and drag to specify the rectangle in the current window. After letting up on the mouse button, the rectangle is specified. Moving the mouse now specifies the line, with a final mouse click defining the line.

Holding down the Shift key while drawing the rectangle will make the text annotation square. Holding down the Shift Key will snap the line to angles of 45 degrees.

After the text pointer is defined, a dialog box then lets the user enter the text. As soon as the Text object is created, the text will be highlighted. The text may be edited immediately. While in design mode double-click on a text object to edit the text.

When moving a text pointer, the pointer endpoint of the line can remain fixed, or move with the rest of the text pointer. To change this setting in automation mode, select or deselect the **Fixed Pointer** check box on the Text Dialog Box for Annotations.

In design mode, click on the object with the right mouse button to do the following:

- Undo the last user action.
- Cut or copy the object to the clipboard.
- Delete the object.
- Select all objects.
- Move the object to the front of the Z-order.
- Move the object to the back of the Z-order.

- Lock and unlock annotation objects.
- Change the Name properties.
- Change the line properties.
- Change the binary raster operations (ROP2) code.
- Change the fill mode.
- Change the foreground and background colors.
- Change the font selection and font characteristics.
- Edit the text.
- Change the fixed state.
- Set and manage hyperlink properties for an object or group of objects.

Compression Quality Factors

You can specify a quality factor when saving an image file to LEAD, JFIF, LEAD2JFIF, LEAD2JFIF, JTIF, LEAD1JTIF, and LEAD2JTIF. The quality factor (Q factor) is a number that determines the degree of loss in the compression process. You can set a value from 2 to 255, where 2 is the highest quality and 255 is the most compression.

For JFIF and JTIF compression only, you can also use a factor of 0 to produce lossless JPEG files

For LEAD CMP compression (8-bit, 12-bit and 24-bit only), you can also use one of the following enhanced options:

Q Factor	**Predefined options for LEAD only**
PQ1	(-1) Perfect quality 1 This option compresses all colors of a 24-bit file and maintains the quality of the original image at a smaller file size. As the name suggests, there is no visual loss of color at this setting.
PQ2	(-2) Perfect quality 2 This will produce a smaller file size than PQ1 while maintaining similar quality.
QFS	(-3) Quality far more important than size This option removes colors not noticed by the human eye. Most viewers cannot tell the difference between an image compressed at this level and the original image.
QMS	(-4) Quality more important than size While more colors are removed, most of them are colors or shades that are close to one another. The compressed image will appear very much like the original image. It will take some study to see the difference.
QS	(-5) Quality and size equally important This option provides the highest compression while maintaining good image quality. Try this option first, then move up or down the list accordingly to obtain acceptable compression size and image quality.
SQS	(-6) Size more important that quality (sharp) This option is recommended for images that have sharp edges. For example, an image that has a text overlay or an image with many straight lines. While it creates a larger file than the next option, it retains better edges.

SQT	(-7) Size more important than quality (less tiling) This option produces less tiling in the image than the previous options. However, it may distort text or straight lines. It is a good option for image database applications.
MCQ	(-8) Maximum compression keeping quality This option provides maximum compression while maintaining as high as possible image quality.
MC	(-9) Maximum compression This option gives maximum compression. It is equivalent to a Q factor of 255.

For the PNG format, the qFactor can be a value between 0 and 9. 0 = (default compression), 1 (fastest

For the ABC compression (FILE_ABC and FILE_TIF_ABC), the qFactor can be one of the following values:

Q Factor	**Predefined options for LEAD only**
QFACTOR_ABCQ_LOSSLESS	[0] Lossless compression. This option compresses a 1-bit file and maintains image data unchanged. Highest quality.
QFACTOR_ABCQ_VIRTUALLOSSLESS	[1] Lossy compression. This option removes the image's noisy pixels and compresses it to a smaller file size than ABCQ_LOSSLESS.
QFACTOR_ABCQ_REMOVEBORDER	[2] Lossy compression. This option removes the image's border, if it exists, and compresses it to a smaller file size than ABCQ_ VIRTUALLOSSLESS.
QFACTOR_ABCQ_ENHANCE	[3] Lossy compression. This option cleans up the image, removes its border if it exists, and compresses it to a smaller file size than ABCQ_REMOVEBORDER.
QFACTOR_ABCQ_MODIFIED1	[4] Lossy compression. This option cleans up the image, removes its border if it exists, and compresses it to a smaller file size than ABCQ_ENHANCE. However, it may distort text or straight lines.
QFACTOR_ABCQ_MODIFIED1_FAST	[5] Same as ABCQ_MODIFIED1 without the border remove or image clean processes.
QFACTOR_ABCQ_MODIFIED2	[6] Lossy compression. This option cleans up the image, removes its border if it exists, and compresses it to a smaller file size than ABCQ_MODIFIED1. However, it may distort text or straight lines. Maximum compression.
QFACTOR_ABCQ_MODIFIED2_FAST	[7] Same as ABCQ_MODIFIED2 without the border remove or image clean processes.
QFACTOR_ABCQ_MODIFIED3	[8] Lossy compression. Provides faster encode and decode speed than ABCQ_MODIFIED1 or

	ABCQ_MODIFIED2. Provides the maximum compression.
QFACTOR_ABCQ_MODIFIED3_FAST	[9] Same as ABCQ_MODIFIED3 without the border remove or image clean processes.
QFACTOR_ABCQ_LOSSLESS_FAST	[10] Faster lossless compression than ABCQ_LOSSLESS. This option compresses a 1-bit file and maintains image data unchanged. Highest quality. Does not produce compression ratios as high as ABCQ_LOSSLESS.
QFACTOR_ABCQ_LOSSY_FAST	[11] Lossy compression. This is the fastest ABC lossy compression option. Does not produce compression ratios as high as the other lossy options.

Compression Using LEAD and JPEG Formats

Compression of color and grayscale graphic image files is useful because the files are big. They can range from 100 kilobytes to more than 200 megabytes. Compressing the image files does the following:

- Dramatically decreases the storage requirements
- Improves the input and output speed within a system
- Improves the transmission speed over networks or phone lines

By incorporating the LEAD and JPEG image compression, you can develop applications that would be impractical otherwise. Image files can be reduced to 200 times smaller than their original size.

The LEAD CMP compression format was created by LEAD Technologies, Inc., and it delivers a much smaller file size and better image quality than other compression techniques, including JPEG.

LEAD's CMP file format allows for decompression to a 24-bit medium at 24-bit color and to an 8-bit medium at 8-bit color without sacrificing image quality. This eliminates the need to convert all images to 8 bits in order to support the low end users or to save one 8-bit file and one 24-bit file. The result is one much smaller file size that can be viewed on a 24-bit video card at 24-bit true color, as well as on an 8-bit VGA card at 256 colors.

LEAD's CMW format uses Wavelet CMP compression. Currently, 24 color images and 8, 12 and 16-bit grayscale images are supported in this format.

The amount of compression is controllable, allowing the compressed image quality to match the needs of your application. Compression Quality Factors describes how the quality factors are used.

JPEG Compliant

JPEG and LEAD CMP compression are intended for use with high resolution images, and they are impractical for use with 4- or 1-bit images.

You can use the CCITT, LEAD 1-bit, RLE, LZW, and ZIPLib compression methods available in many of LEADTOOLS supported formats.

8 and 24-bit Images

Using JPEG and LEAD CMP or CMW compression, color images are 24 bits per pixel, and grayscale images are 8 bits per pixel. Therefore, to compress an 8-bit color image, the internal JPEG and LEAD CMP or CMW compression functions must convert the 8-bit data into raw RGB 24-bit before compressing it as a color image.

Compressing the original 24-bit image will result in a smaller file size and higher quality than compressing an optimized 8-bit color image.

LEADTOOLS functions compress 8-bit grayscale as 8-bit grayscale JPEG or CMP images.

You can use RLE, LZW and ZIPLib (PNG) compression methods available in many of the supported formats.

Summary of All Supported Image File Formats

- ABIC - ABIC Format

Constant	Read Support	Write Support	Description
FILE_ABIC	1, 4 BPP	1, 4 BPP	[185] Raw ABIC compressed data

- AFP - AFP Format

Constant	Read Support	Write Support	Description
FILE_AFP	24 BPP	None	[252] IBM This format is part of IBM's document imaging system.

- ANI - Windows Animated Cursor

Constant	Read Support	Write Support	Description
FILE_ANI	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[119] Windows Animated Cursor.

- AVI - Windows AVI Format -

Constant	Read Support	Write Support	Description
FILE_AVI	24 BPP	None	[59] Windows AVI (video) file.

Deepsky Imaging can open an AVI file to get the first frame of the image. Owners of Stellacam II and III CCD video cameras who capture AVI will appreciate this feature.

- BMP - Windows Bitmap Formats

Constant	Read Support	Write Support	Description
FILE_BMP	1, 4, 8, 16, 24, 32 BPP	1, 4, 8, 16, 24, 32 BPP	[6] Windows BMP, with no compression.
FILE_BMP_RLE	4, 8 BPP	4, 8 BPP	[84] Windows BMP, with RLE compression.
FILE_OS2	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[14] OS/2 BMP version 1.x.
FILE_OS2_2	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[74] OS/2 BMP version 2.x.

- CIN - Cineon Format

Constant	Read Support	Write Support	Description
FILE_CIN	24 BPP	24 BPP	[298] Kodak Cineon Format.

- CLP - Microsoft Windows Clipboard Format

Constant	Read Support	Write Support	Description
FILE_CLP	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[114] Microsoft Windows Clipboard Uncompressed.
FILE_CLP_RLE	4, 8 BPP	8 BPP	[291] Microsoft Windows Clipboard RLE Compressed.

- CMP - LEAD Compressed

Constant	Read Support	Write Support	Description
FILE_CMP	8 BPP (Grayscale) 24 BPP	8 BPP (Grayscale) 24 BPP	[5] LEAD CMP compressed format.

- CMW - LEAD Wavelet Compressed

FILE_CMW	8, 12, 16 BPP (Grayscale) 24 BPP	8, 12, 16 BPP (Grayscale) 24 BPP	[165] LEAD Wavelet CMP compressed format.

- CRW - Canon RAW Format

Constant	Read Support	Write Support	Description
FILE_CRW	24 BPP	None	[296] Cannon raw format.

- CUR - Windows Cursors and Icons

Constant	Read Support	Write Support	Description
FILE_WIN_ICO	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[91] Windows Icon.
FILE_WIN_CUR	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[92] Windows Cursor.

- CUT - Dr. Halo Format

Constant	Read Support	Write Support	Description
FILE_CUT	8 BPP	8 BPP	[108] Dr. Halo.

- DCR - Kodak Professional Digital Camera Format

Constant	Read Support	Write Support	Description
FILE_DCR	48 BPP	None	[292] Kodak Professional Digital Camera Format

- DCS - Kodak Professional Digital Camera System Format

Constant	Read Support	Write Support	Description
FILE_DCS	16 (Grayscale), 24 BPP	None	[266] Kodak Professional Digital Camera System Format

- DCX - DCX Format

Constant	Read Support	Write Support	Description
FILE_PCX	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[1] ZSoft PCX.

- DJVU - DjVu Format

Constant	Read Support	Write Support	Description
FILE_DJVU	1, 8, 24 BPP	None	[308] LizardTech DjVu.

- ECW - Enhanced Compressed Wavelet Format

Constant	Read Support	Write Support	Description
FILE_ECW	24 BPP	24 BPP	[277] ER Mapper Enhanced Compressed Wavelet.

- EMF - Windows Metafile Formats

Constant	Read Support	Write Support	Description
FILE_WMF	Yes	Yes	[15] Windows Metafile.
FILE_EMF	Yes	Yes	[116] Windows Enhanced Metafile.

- EPS - Encapsulated PostScript Format

Constant	Read Support	Write Support	Description
FILE_EPSPOSTSCRIPT	1, 4, 8, 24 BPP	None	[300] Encapsulated PostScript.
FILE_EPSTIFF	1, 4, 8, 16, 24, 32 BPP	None	[63] Encapsulated PostScript with TIFF preview.
FILE_EPSWMF	24 BPP	None	[64] Encapsulated PostScript with WMF preview.
FILE_EPS	1, 8, 24 BPP	8 BPP (Grayscale)	[16] Encapsulated PostScript.

- EXIF - Exif Formats

Constant	Read Support	Write Support	Description
FILE_EXIF	24 BPP	24 BPP	[96] Exif file containing a TIFF image, with no compression and with RGB color space.
FILE_EXIF_YCC	24 BPP	24 BPP	[97] Exif file containing a TIFF image, with no compression and with YCbCr color space.
FILE_EXIF_JPEG_422	24 BPP	24 BPP	[98] Exif file containing a JPEG compressed image and YUV 4:2:2 color space.
FILE_EXIF_JPEG_411	24 BPP	24 BPP	[101] Exif file containing a JPEG compressed image and YUV 4:1:1 color space.

- FIT - FITS Format

Constant	Read Support
FILE_FIT	8 BPP (unsigned binary integer - gray) 16 BPP (twos complement signed integers - gray) 32 BPP (twos complement signed integers - color)

- FLC - Flic Animation Format

Constant	Read Support	Write Support	Description
FILE_FLC	8 BPP	8 BPP	[134] Flic Animation 256 color.
FILE_FLI	8 BPP	none	[61] Flic Animation 64 color.

- FPX - Kodak Format

Constant	Read Support	Write Support	Description
FILE_PCD	8, 24 BPP	None	[57] Kodak PhotoCD.
FILE_FPX	8, 24 BPP	8, 24 BPP	[80] FlashPix, with no compression.
FILE_FPX_SINGLE_COLOR	8, 24 BPP	8, 24 BPP	[81] FlashPix, compressed with the single color method.
FILE_FPX_JPEG	8, 24 BPP	8, 24 BPP	[82] FlashPix, compressed with JPEG, using the default Q factor.
FILE_FPX_JPEG_QFACTOR	8, 24 BPP	8, 24 BPP	[83] FlashPix, compressed with JPEG, using a specified Q factor.

- GIF - Compuserve GIF Format

Constant	Read Support	Write Support	Description
FILE_GIF	1, 2, 3, 4, 5, 6, 7, 8 BPP	1, 2, 3, 4, 5, 6, 7, 8 BPP	[2] CompuServe GIF.

- ICO - Windows Icons

Constant	Read Support	Write Support	Description
FILE_WIN_ICO	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[91] Windows Icon.
FILE_WIN_CUR	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[92] Windows Cursor.

- IFF - Interchange File Formats

Constant	Read Support	Write Support	Description
FILE_IFF_ILBM	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	[111] Interchange File - RLE Compressed.
FILE_IFF_CAT	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	[112] Interchange File - multiple images per file- RLE Compressed.
FILE_IFF_ILBM_UNCOMPRESSED	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	[303] Interchange File - Uncompressed.
FILE_IFF_CAT_UNCOMPRESSED	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	1, 2, 3, 4, 5, 6, 7, 8, 24 BPP	[304] Interchange File - multiple images per file- Uncompressed.

- JBG - JBIG Format

Constant	Read Support	Write Support	Description
FILE_JBIG	1, 2, 3, 4, 5, 6, 7, 8, 12, 16, 24, 32 BPP	1, 2, 3, 4, 5, 6, 7, 8, 12, 16, 24, 32 BPP	[115] JBIG.
FILE_TIF_JBIG	1, 2, 3, 4, 5, 6, 7, 8, 12, 16, 24, 32 BPP	1, 2, 3, 4, 5, 6, 7, 8, 12, 16, 24, 32 BPP	[139] TIFF with JBIG compression.

- JPG - JPEG Compressed

Constant	Read Support	Write Support	Description
FILE_CMP	8 BPP (Grayscale) 24 BPP	8 BPP (Grayscale) 24 BPP	[5] LEAD CMP compressed format.
FILE_JPEG	8, 12, 16 BPP (Grayscale) 24 BPP	8, 12, 16 BPP (Grayscale) 24 BPP	[10] JPEG File Interchange Format.
FILE_JPEG_411	8 BPP (Grayscale) 24 BPP	8 BPP (Grayscale) 24 BPP	[21] JPEG File Interchange Format, 4:1:1.
FILE_JPEG_422	8 BPP (Grayscale) 24 BPP	8 BPP (Grayscale) 24 BPP	[21] JPEG File Interchange Format, 4:2:2.
FILE_JPEG_LAB	24 BPP	24 BPP	[171] JPEG File Interchange Format, CieLAB 4:4:4.
FILE_JPEG_LAB_411	24 BPP	24 BPP	[172] JPEG File Interchange Format, CieLAB 4:1:1.
FILE_JPEG_LAB_422	24 BPP	24 BPP	[173] JPEG File Interchange Format, CieLAB 4:2:2.
FILE_JPEG_RGB	24 BPP	24 BPP	[182] JPEG File Interchange Format, RGB 4:4:4.

- KDC - Kodak Digital Camera Format

Constant	Read Support	Write Support	Description
FILE_KDC_120	24 BPP	None	[263] KDC DC120.
FILE_KDC_40	24 BPP	None	[264] KDC DC40.
FILE_KDC_50	24 BPP	None	[265] KDC DC50.

- MPG - MPEG Video Format

Constant	Read Support	Write Support	Description
FILE_MPEG1	24 BPP	None	[243] MPEG-1 (video) file.
FILE_MPEG2	24 BPP	None	[246] MPEG-2 (video) file.

- PBM - Portable Bitmap Utilities Format

Constant	Read Support	Write Support	Description
FILE_PBM_BINARY	1 BPP	1 BPP	[103] Portable Bitmap - Binary File.
FILE_PBM_ASCII	1 BPP	1 BPP	[102] Portable Bitmap - ASCII File.
FILE_PGM_BINARY	8 BPP (Grayscale)	8 BPP (Grayscale)	[105] Portable Greymap - Binary File.
FILE_PGM_ASCII	8 BPP (Grayscale)	8 BPP (Grayscale)	[104] Portable Greymap - ASCII File.
FILE_PPM_BINARY	24 BPP	24 BPP	[107] Portable Pixelmap - Binary File.
FILE_PPM_ASCII	24 BPP	24 BPP	[106] Portable Pixelmap - ASCII File.

- PCD - Kodak Format

Constant	Read Support	Write Support	Description
FILE_PCD	8, 24 BPP	None	[57] Kodak PhotoCD.
FILE_FPX	8, 24 BPP	8, 24 BPP	[80] FlashPix, with no compression.
FILE_FPX_SINGLE_COLOR	8, 24 BPP	8, 24 BPP	[81] FlashPix, compressed with the single color method.
FILE_FPX_JPEG	8, 24 BPP	8, 24 BPP	[82] FlashPix, compressed with JPEG, using the default Q factor.
FILE_FPX_JPEG_QFACTOR	8, 24 BPP	8, 24 BPP	[83] FlashPix, compressed with JPEG, using a specified Q factor.

- PCT - Macintosh Pict Format

Constant	Raster Read Support	Raster Write Support	Vector Read Support	Vector Write Support	Description
FILE_PCT	1, 4, 8, 16, 24 BPP	1, 4, 8, 16, 24 BPP	Yes	Yes	[56] Macintosh QuickDraw

- PCX - PCX Format

Constant	Read Support	Write Support	Description
FILE_PCX	1, 4, 8, 24 BPP	1, 4, 8, 24 BPP	[1] ZSoft PCX.

- PNG - Portable Network Graphics Format

Constant	Read Support	Write Support	Description
FILE_PNG	1, 4, 8, 16, 24, 32 BPP	1, 4, 8, 24, 32 BPP	[75] Portable Network Graphics (PNG).

- PSD - PhotoShop 3.0 Format

Constant	Read Support	Write Support	Description
FILE_PSD	1, 8, 16, 24 BPP	1, 8, 24 BPP	[76] Adobe Photoshop 3.0.

- PSP - Paint Shop Pro Format

Constant	Read Support	Write Support	Description
FILE_PSP	1, 4, 8 BPP (Grayscale) 8, 24 BPP (Color)	1, 4, 8 BPP (Grayscale) 8, 24 BPP (Color)	[267] PaintShop Pro Format.
FILE_PSP_RLE	1, 4, 8 BPP (Grayscale) 8, 24 BPP (Color)	1, 4, 8 BPP (Grayscale) 8, 24 BPP (Color)	[268] PaintShop Pro Format - RLE Compressed.

- PTK - PTOCA Format

Constant	Read Support	Write Support	Description
FILE_PTOCA	24 BPP	None	[249] Presentation Text Object Content Architecture format.

- RAS - SUN Raster Format

Constant	Read Support	Write Support	Description
FILE_RAS	1, 4, 8, 24, 32 BPP	1, 4, 8, 24, 32 BPP	[55] Sun Raster, uncompressed.
FILE_RAS_RLE	1, 4, 8, 24, 32 BPP	1, 4, 8, 24, 32 BPP	[288] Sun Raster, RLE compressed.

- SCT - Scitex Continuous Tone Format

Constant	Read Support	Write Support	Description
FILE_SCT	24 BPP	24 BPP	[250] Scitex Continuous Tone Format.

- SFF - Structured Fax File Format

Constant	Read Support	Write Support	Description
FILE_SFF	1 BPP	1 BPP	[302] Structured Fax File Format.

- SGI - Silicon Graphics Image Format

Constant	Read Support	Write Support	Description
FILE_SGI	8, 24, 32 BPP	8, 24, 32 BPP	[142] Silicon Graphics Image - uncompressed
FILE_SGI_RLE	8, 24, 32 BPP	8, 24, 32 BPP	[143] Silicon Graphics Image - RLE compressed

- SID - MrSid Format

Constant	Read Support	Write Support	Description
FILE_SID	24 BPP	None	[306] MrSid Format.

- TGA - Truevision TARGA Format

Constant	Read Support	Write Support	Description
FILE_TGA	8, 16, 24, 32 BPP	8, 16, 24, 32 BPP	[4] TARGA, uncompressed.
FILE_TGA_RLE	8, 16, 24, 32 BPP	8, 16, 24, 32 BPP	[262] TARGA, RLE compressed.

- TIFF - Tagged Image File Format

Constant	Read Support	Write Support	Description
FILE_TIF	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	[3] Tagged Image File Format, with no compression and with RGB color space.
FILE_TIF_CMYK	24, 32 BPP	24, 32 BPP	[85] Tagged Image File Format, with no compression and with CMYK color space.
FILE_TIF_YCC	24 BPP	24 BPP	[93] Tagged Image File Format, with no compression and with YCbCr color space.
FILE_TIF_PACKBITS	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32 BPP	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32 BPP	[87] Tagged Image File Format with PackBits Compression and RGB color space.
FILE_TIF_PACKBITS_CMYK	24, 32 BPP	24, 32 BPP	[88] Tagged Image File Format with PackBits Compression and CMYK color space.
FILE_TIF_PACKBITS_YCC	24 BPP	24 BPP	[95] Tagged Image File Format with PackBits Compression and color YCbCr space.
FILE_TIFLZW	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	[17] Tagged Image File Format with LZW Compression and RGB color space.
FILE_TIFLZW_CMYK	24, 32 BPP	24, 32 BPP	[86] Tagged Image File Format with LZW Compression and CMYK color space
FILE_TIFLZW_YCC	24 BPP	24 BPP	[94] Tagged Image File Format with LZW Compression and YCbCr color space.

Constant	Read Support	Write Support	Description
FILE_TIF	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	[3] Tagged Image File Format, with no compression and with RGB color space.
FILE_TIF_CMYK	24, 32 BPP	24, 32 BPP	[85] Tagged Image File Format, with no compression and with CMYK color space.
FILE_TIF_YCC	24 BPP	24 BPP	[93] Tagged Image File Format, with no compression and with YCbCr color space.
FILE_TIF_PACKBITS	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32 BPP	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32 BPP	[87] Tagged Image File Format with PackBits Compression and RGB color space.
FILE_TIF_PACKBITS_CMYK	24, 32 BPP	24, 32 BPP	[88] Tagged Image File Format with PackBits Compression and CMYK color space.
FILE_TIF_PACKBITS_YCC	24 BPP	24 BPP	[95] Tagged Image File Format with PackBits Compression and color YCbCr space.
FILE_TIFLZW	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	1, 2, 3, 4, 5, 6, 7, 8, 16, 24, 32, 48, 64 BPP	[17] Tagged Image File Format with LZW Compression and RGB color space.
FILE_TIFLZW_CMYK	24, 32 BPP	24, 32 BPP	[86] Tagged Image File Format with LZW Compression and CMYK color space
FILE_TIFLZW_YCC	24 BPP	24 BPP	[94] Tagged Image File Format with LZW Compression and YCbCr color space.

- TIFF - Tagged Image File Format / CCITT & TIFX - Xerox Internet Fax File Format

Constant	Read Support	Write Support	Description
FILE_CALS	1 BPP	1 BPP	[50] CALS Raster file.
FILE_CALS2	1 BPP	1 BPP	[130] CALS CCITT G4 compressed.
FILE_CALS3	1 BPP	1 BPP	[131] CALS Fax Group 4 compressed.
FILE_CALS4	1 BPP	1 BPP	[129] CALS CCITT G4 Tiled.

Constant	Read Support	Write Support	Description
FILE_WFX_G3_1D	1 BPP	1 BPP	[69] Winfax, compressed using CCITT group 3, 1 dimension
FILE_WFX_G4	1 BPP	1 BPP	[70] Winfax, compressed using CCITT group 4.

Constant	Read Support	Write Support	Description
FILE_FAX_G3_1D	1 BPP	1 BPP	[66] Raw FAX, compressed using CCITT group 3, 1 dimension.
FILE_FAX_G3_1D_NOEOL	1 BPP	1 BPP	[162] Raw FAX, compressed using CCITT group 3, 1 dimension.with no EOL.
FILE_FAX_G3_2D	1 BPP	1 BPP	[67] Raw FAX, compressed using CCITT group 3, 2 dimensions.
FILE_FAX_G4	1 BPP	1 BPP	[68] Raw FAX, compressed using CCITT group 4.

Constant	Read Support	Write Support	Description
FILE_AWD	1 BPP	1 BPP	[99] Microsoft FAX format.

Constant	Read Support	Write Support	Description
FILE_TIFX_JBIG	1 BPP	1 BPP	[269] TIFF-FX format. JBIG compressed.
FILE_TIFX_JBIG_T43	3 BPP	3 BPP	[270] TIFF-FX format. JBIG compressed.
FILE_TIFX_JBIG_T43_ITULAB	8 BPP	8 BPP	[271] TIFF-FX format. JBIG compressed.
FILE_TIFX_JBIG_T43_GS	1 BPP	1 BPP	[272] TIFF-FX format. JBIG compressed.
FILE_TIFX_FAX_G4	1 BPP	1 BPP	[273] TIFF-FX format, compressed using CCITT group 4.
FILE_TIFX_FAX_G3_1D	1 BPP	1 BPP	[274] TIFF-FX format, compressed using CCITT group 3, 1 dimension.
FILE_TIFX_FAX_G3_2D	1 BPP	1 BPP	[275] TIFF-FX format, compressed using CCITT group 3, 2 dimensions.
FILE_TIFX_JPEG	8 BPP (Grayscale), 24 BPP	8 BPP (Grayscale), 24 BPP	[276] TIFF-FX format. JPEG compressed.

- WBMP - Wireless Bitmap Format

Constant	Read Support	Write Support	Description
FILE_WBMP	1 BPP	1 BPP	[170] Wireless Bitmap.

- WMF - Windows Metafile Formats

Constant	Read Support	Write Support	Description
FILE_WMF	Yes	Yes	[15] Windows Metafile.
FILE_EMF	Yes	Yes	[116] Windows Enhanced Metafile.

- WPG - WordPerfect Format

Constant	Read Support	Write Support	Description
FILE_WPG	1, 4, 8 BPP	1, 4, 8 BPP	[54] WordPerfect Graphics Format.

- XPM – XpicMap

Constant	Read Support	Write Support	Description
FILE_XPM	8, 16, 24, 32 BPP	8, 16, 24, 32 BPP	[109] XWindows XPicMap.

- XWD - X WindowDump

Constant	Read Support	Write Support	Description
FILE_XWD10	1, 4, 8 BPP	1, 4, 8 BPP	[132] XWindows X Window dump, version 10.
FILE_XWD11	1, 4, 8, 16. 24, 32 BPP	1, 4, 8, 16. 24, 32 BPP	[133] XWindows X Window dump, version 11.

- ABC - ABC Format

Constant	Read Support	Write Support	Description
FILE_ABC	1 BPP	1 BPP	[32] LEAD ABC 1 bit, lossless compression.
FILE_TIF_ABC	1 BPP	1 BPP	[180] TIFF with LEAD ABC 1 bit, lossless compression.

- AWD - Microsoft FAX Format

Constant	Read Support	Write Support	Description
FILE_AWD	1 BPP	1 BPP	[99] Microsoft FAX format.

- CAL - CALS Raster Format

Constant	Read Support	Write Support	Description
FILE_CALS	1 BPP	1 BPP	[50] CALS Raster file.
FILE_CALS2	1 BPP	1 BPP	[130] CALS CCITT G4 compressed.
FILE_CALS3	1 BPP	1 BPP	[131] CALS Fax Group 4 compressed.
FILE_CALS4	1 BPP	1 BPP	[129] CALS CCITT G4 Tiled.

- CMP - LEAD 1-Bit Format

Constant	Read Support	Write Support	Description
FILE_LEAD1BITA	1 BPP	1 BPP	[31] LEAD Proprietary 1-bit Compression Format, type A.
FILE_LEAD1BIT	1 BPP	1 BPP	[26] LEAD Proprietary 1-bit Compression Format, type B.

- FAX - Raw Fax Format

Constant	Read Support	Write Support	Description
FILE_FAX_G3_1D	1 BPP	1 BPP	[66] Raw FAX, compressed using CCITT group 3, 1 dimension.
FILE_FAX_G3_1D_NOEOL	1 BPP	1 BPP	[162] Raw FAX, compressed using CCITT group 3, 1 dimension.with no EOL.
FILE_FAX_G3_2D	1 BPP	1 BPP	[67] Raw FAX, compressed using CCITT group 3, 2 dimensions.
FILE_FAX_G4	1 BPP	1 BPP	[68] Raw FAX, compressed using CCITT group 4.

- FAX - LaserView LaserData Format

Constant	Read Support	Write Support	Description
FILE_LASERDATA	1 BPP	None	[121] LaserData CCITT G4

- ICA - Image Object Content Architecture (IOCA/MODCA)

Constant	Read Support	Write Support	Description
FILE_ICA_ABIC	1, 4 BPP	1, 4 BPP	[184] IOCA, ABIC compressed.
FILE_AFPICA_G3_1D	1 BPP	1 BPP	[309] IOCA, G3 1D compressed.
FILE_AFPICA_G3_2D	1 BPP	1 BPP	[310] IOCA, G3 2D compressed.
FILE_AFPICA_G4	1 BPP	1 BPP	[311] IOCA, G4 compressed.
FILE_AFPICA_UNCOMPRESSED	1 BPP	1 BPP	[312] IOCA, uncompressed.
FILE_AFPICA_IBM_MMR	1 BPP	1 BPP	[313] IOCA, IBM MMR compressed.
FILE_ICA_G3_1D	1 BPP	1 BPP	[71] IOCA, compressed using CCITT group 3, 1 dimension.
FILE_ICA_G3_2D	1 BPP	1 BPP	[72] IOCA, compressed using CCITT group 3, 2 dimensions.
FILE_ICA_G4	1 BPP	1 BPP	[73] IOCA, compressed using CCITT group 4.
FILE_ICA_IBM_MMR	1 BPP	1 BPP	[117] IOCA, compressed using IBM MMR, with the MO:DCA wrapper.
FILE_ICA_UNCOMPRESSED	1 BPP	1 BPP	[253] IOCA, uncompressed, with the MO:DCA wrapper.
FILE_RAWICA_G3_1D	1 BPP	1 BPP	[77] IOCA, compressed using CCITT group 3, 1 dimension, without the MO:DCA wrapper.
FILE_RAWICA_G3_2D	1 BPP	1 BPP	[78] IOCA, compressed using CCITT group 3, 2 dimensions, without the MO:DCA wrapper.
FILE_RAWICA_G4	1 BPP	1 BPP	[79] IOCA, compressed using CCITT group 4, without the MO:DCA wrapper.
FILE_RAWICA_IBM_MMR	1 BPP	1 BPP	[118] IOCA, compressed using IBM MMR, without the MO:DCA wrapper.
FILE_RAWICA_UNCOMPRESSED	1 BPP	1 BPP	[254] IOCA, uncompressed, without the MO:DCA wrapper.

- IMG - GEM Image Format

Constant	Read Support	Write Support	Description
FILE_IMG	1 BPP	1 BPP	[52] GEM Image.

- ITG - Intergraph Format

Constant	Read Support	Write Support	Description
FILE_INTERGRAPH_RLE	1 BPP	1 BPP	[122] ITG, Intergraph RLE compressed file.
FILE_INTERGRAPH_CCITT_G4	1 BPP	1 BPP	[301] ITG, Intergraph CCITT G4 compressed file.

- MAC - MacPaint Format

Constant	Read Support	Write Support	Description
FILE_MAC	1 BPP	1 BPP	[51] MacPaint - Macintosh Paint.

- MSP - Microsoft Paint

Constant	Read Support	Write Support	Description
FILE_MSP	1 BPP	1 BPP	[53] Microsoft Paint.

- SMP - Xionics Format

Constant	Read Support	Write Support	Description
FILE_SMP	1 BPP	1 BPP	[256] Xionics format.
FILE_SMP_G3_1D	1 BPP	1 BPP	[257] Xionics format, compressed using CCITT Group 3 1D.
FILE_SMP_G3_2D	1 BPP	1 BPP	[258] Xionics format, compressed using CCITT Group 3 2D.
FILE_SMP_G4	1 BPP	1 BPP	[259] Xionics format, compressed using CCITT Group 4.

- WFX - WinFax Format

Constant	Read Support	Write Support	Description
FILE_WFX_G3_1D	1 BPP	1 BPP	[69] Winfax, compressed using CCITT group 3, 1 dimension
FILE_WFX_G4	1 BPP	1 BPP	[70] Winfax, compressed using CCITT group 4.

- XBM - XBitMap Format

Constant	Read Support	Write Support	Description
FILE_XBM	1 BPP	1 BPP	[110] XWindows XBitMap.

Deepsky Imaging Effects Gallery

Blur Effects

The following pages show off some of the effects that Deepsky Imaging can do to your images. While many aren't practical for astronomy, they nonetheless look pretty cool.

Effect: Gaussian Blur

Description: Smoothes or blurs an image by applying a Gaussian filters to the specified image.

Usage: Removing noise and blur.

Effect: Motion Blur

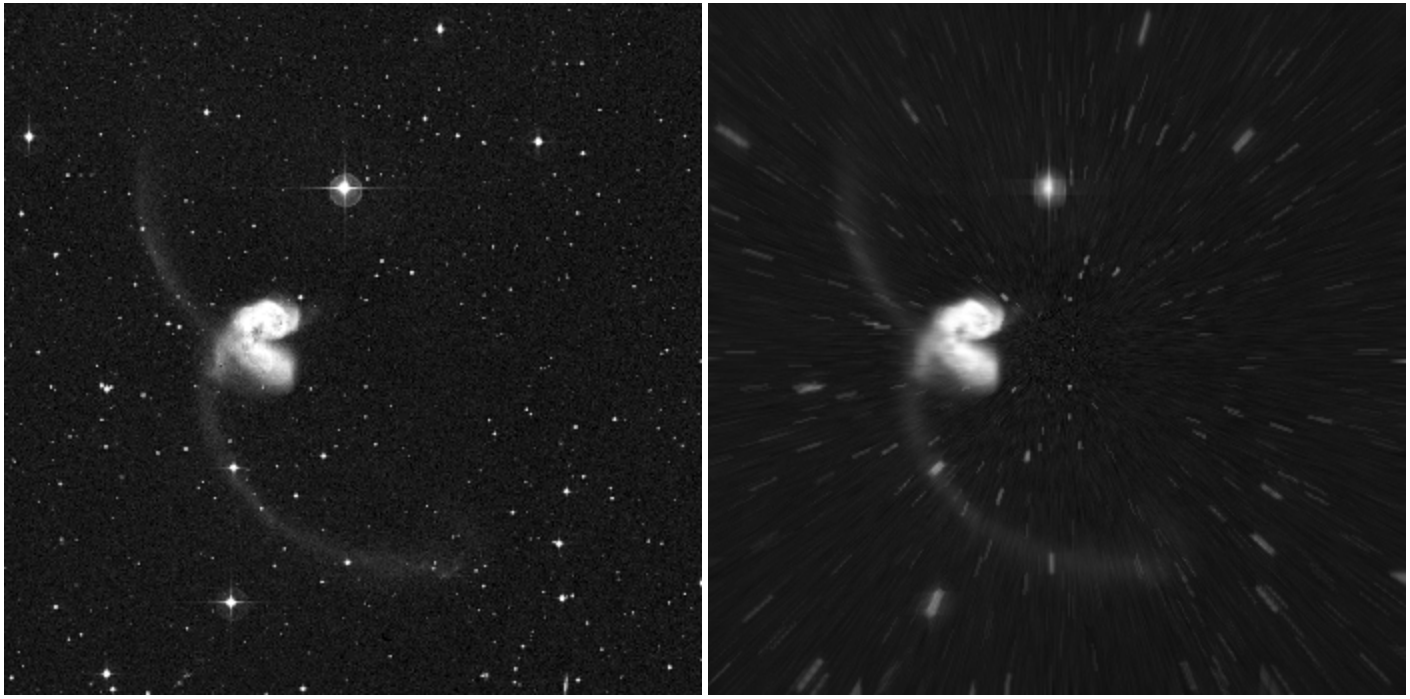
Description: Applies a filter, which creates the illusion of movement in an image.

Usage: Removing noise and Blur, also shows the image's objects as in motion view.

Effect: Zoom Blur

Description: Blurs the image along radial lines starting from a specified center point.

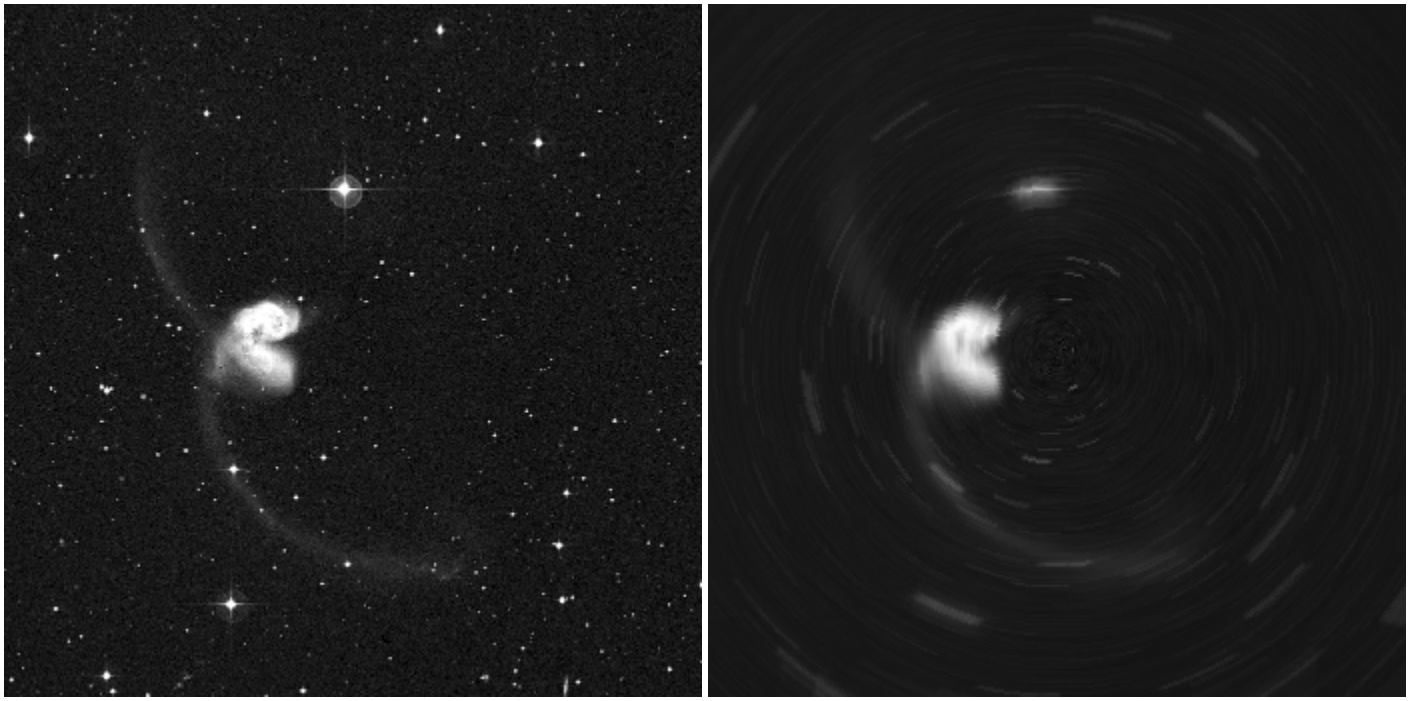
Usage: Simulates the blur of capturing the image while zooming the camera



Effect: Radial Blur

Description: Blurs the image by rotating the pixels around the specified center point

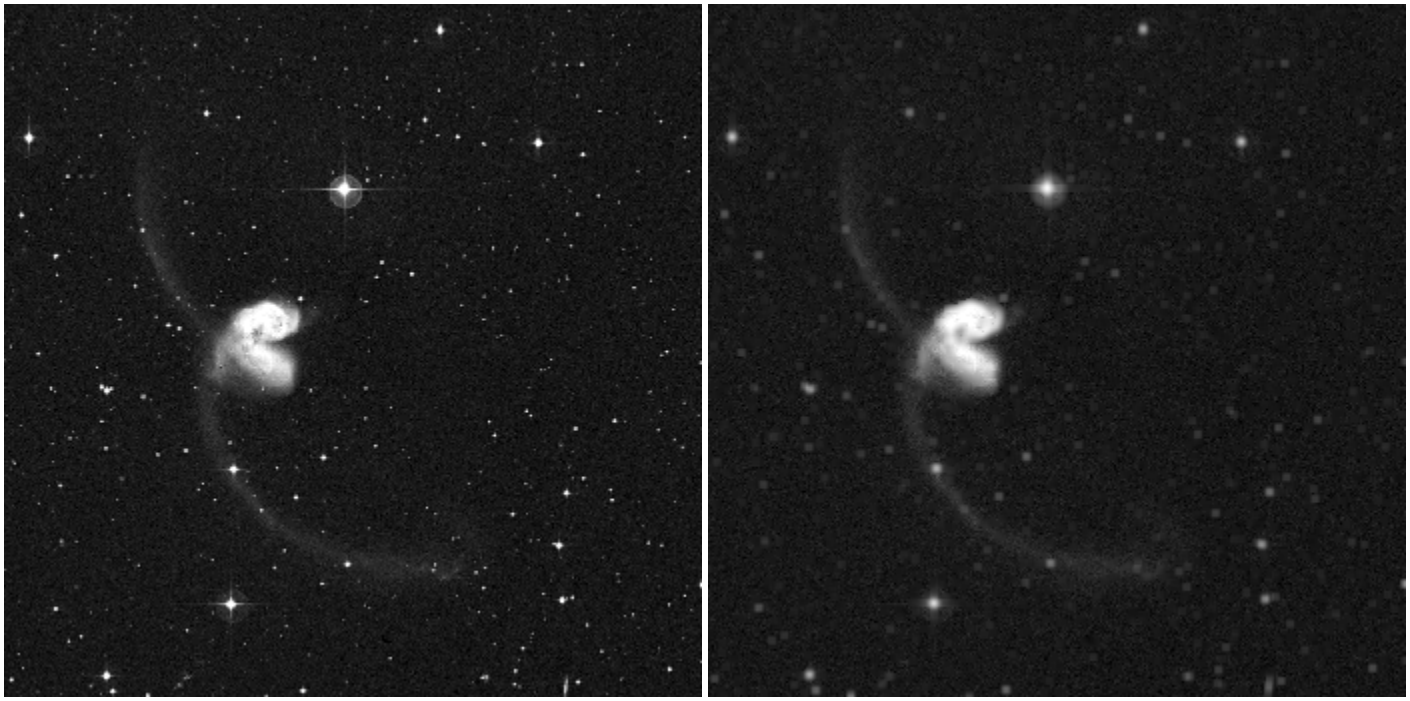
Usage: Simulates the blur of capturing the image while rotating the camera

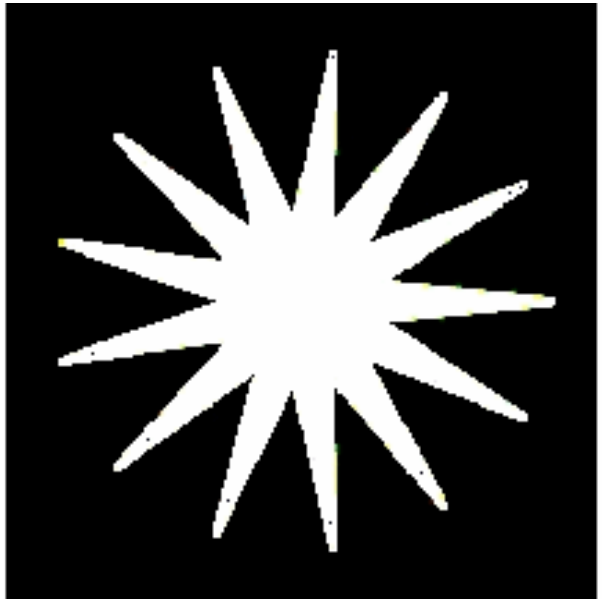


Effect: Anti Alias

Description: Applies an anti-aliasing filter to the specified image

Usage: Anti-aliasing filter is used to remove alias, remove blur, smooth edges in an image, and smooth jagged diagonal lines.





Before

After

Effect: Average

Description: Changes the color of each pixel in a image to the average color of pixels in its neighborhood. This results in a blur effect.

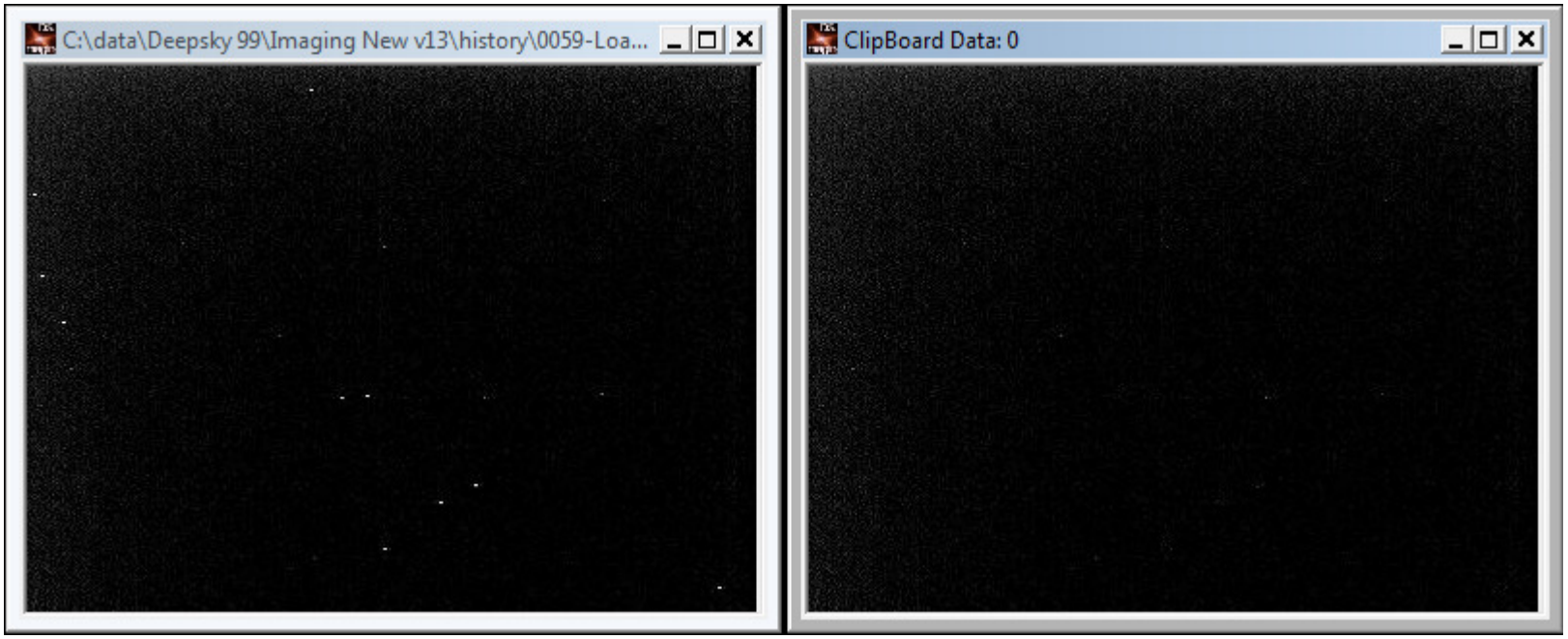
Usage: Removing noise and blur.

Noise Filters

Effect: Remove Hot Pixels

Description: Removes single pixels from the image caused by cosmic ray hits or by defects of the CCD

Usage: Use this feature to find and remove “hot pixels”, which are bright isolated points on the image.



Before After

Effect: Median

Description: Changes the color of each pixel in an image to the median color of pixels in its neighborhood.

Usage: The Median filter can be used to remove negative exponential, blur, and salt and pepper type of noise while preserving the edge details within an image.

Effect: Add Noise

Description: Adds random pixels to an image, letting you specify the percentage of coverage and the color plane.

Usage: Adding random noise to the image

Effect: Binary Filter (Erosion)

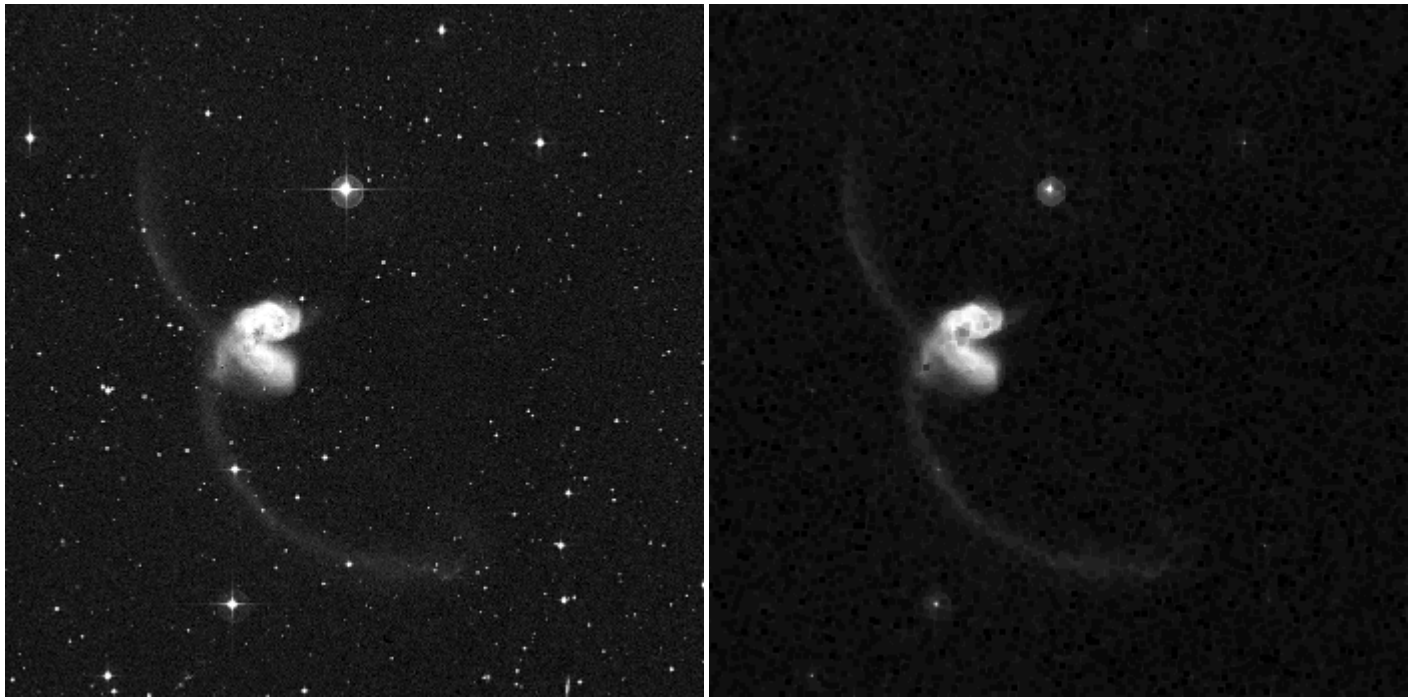
Description: This filter imposes a binary filter on an image. It performs a user defined effect by using suitable mask.

Usage: This filter can be used for the erosion or dilation of objects, removal of noise in an image, detect edges, smoothing the image, and can also be used for area measurement

Effect: Binary Filter (Dilation)

Description: This filter imposes a binary filter on an image. It performs a user defined effect by using suitable mask.

Usage: This filter can be used for the erosion or dilation of objects, removal of noise in an image, detect edges, smoothing the image, and can also be used for area measurement



Effect: Deinterlace

Description: Deinterlaces a video source image

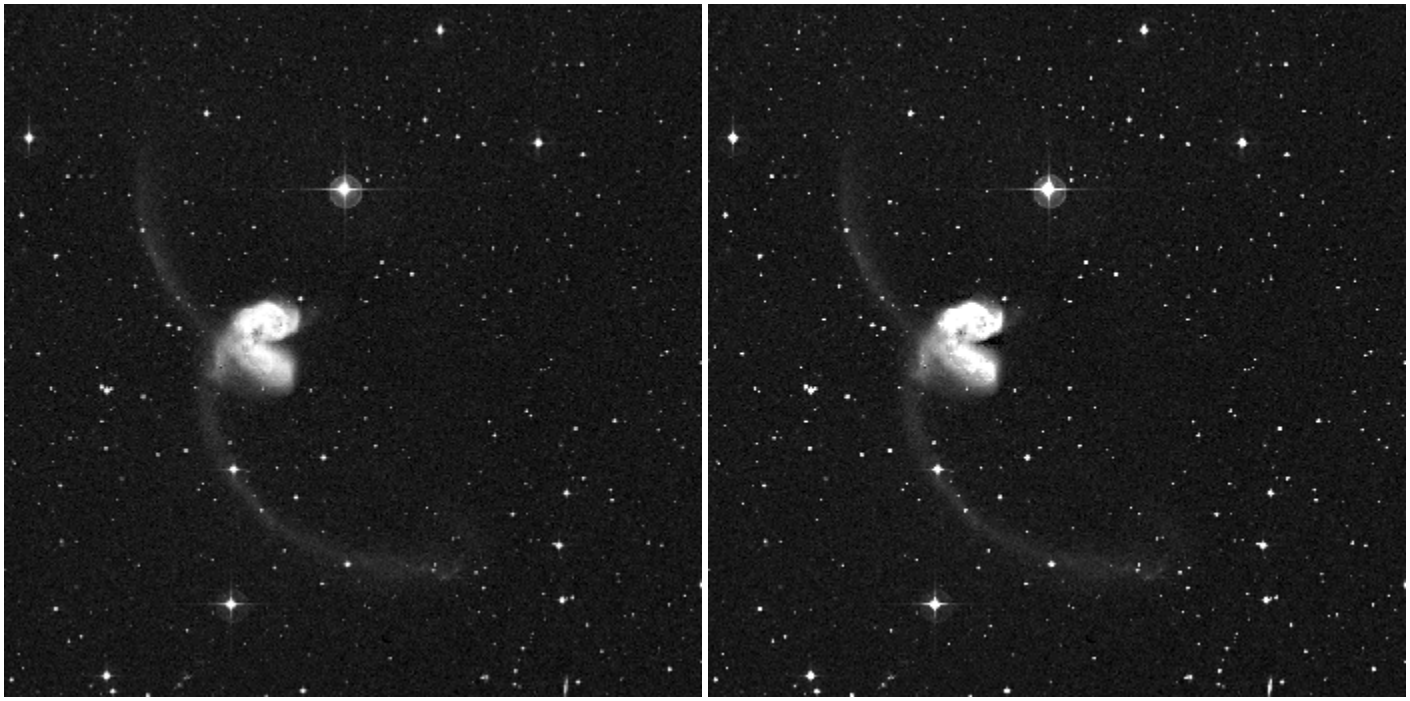
Usage: Remove interlacing lines from an image taken from a video source

Sharpening Filters

Effect: Unsharp Mask

Description: Sharpens the specified image by applying the unsharp mask. Unsharpen mask tends to show more details in areas of an image that are normally not visible.

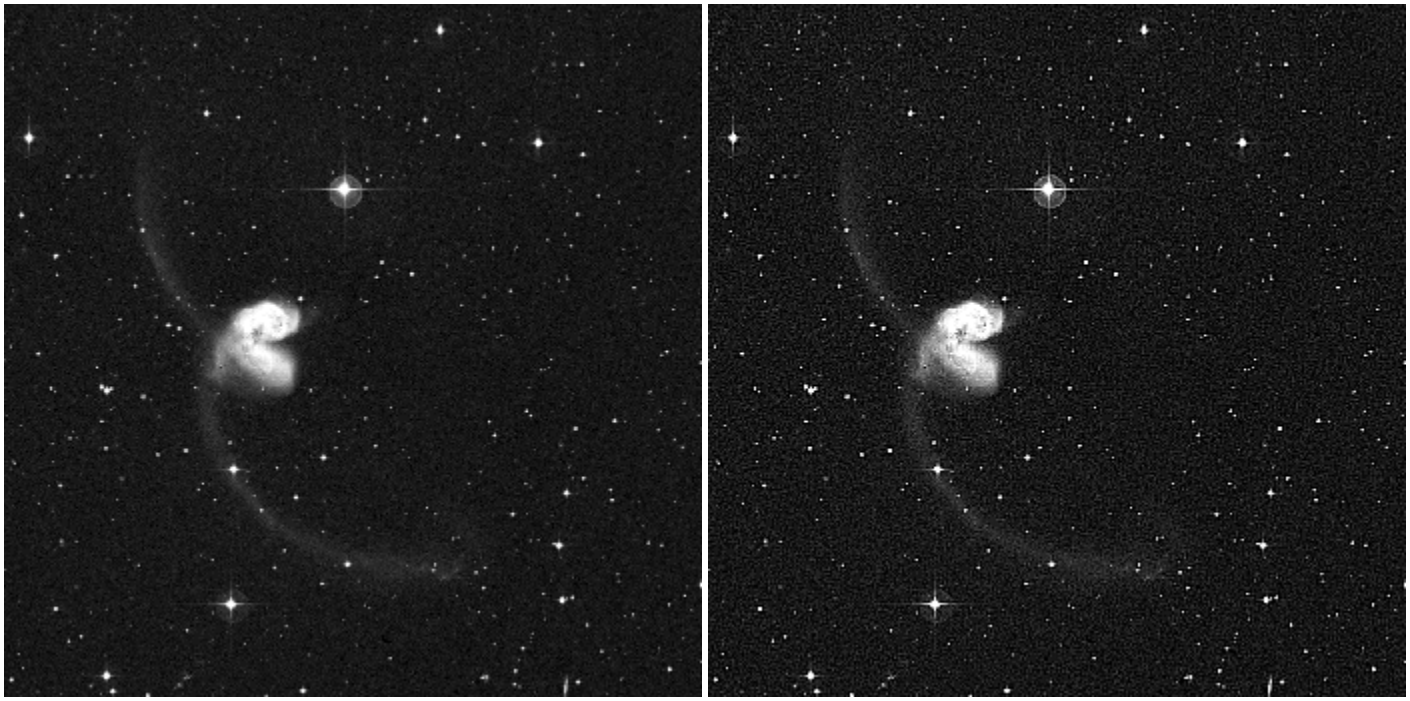
Usage: Unsharp mask is a technique used to enhance the edges of an image, remove blur, and increase image's sharpness.



Effect: Sharpen

Description: Increases or decreases the sharpness of the image in the specified image.

Usage: Sharpen the image edges



Effect: High Pass Filter

Description: Removes low frequency details in an image, resulting in a sharpened image.

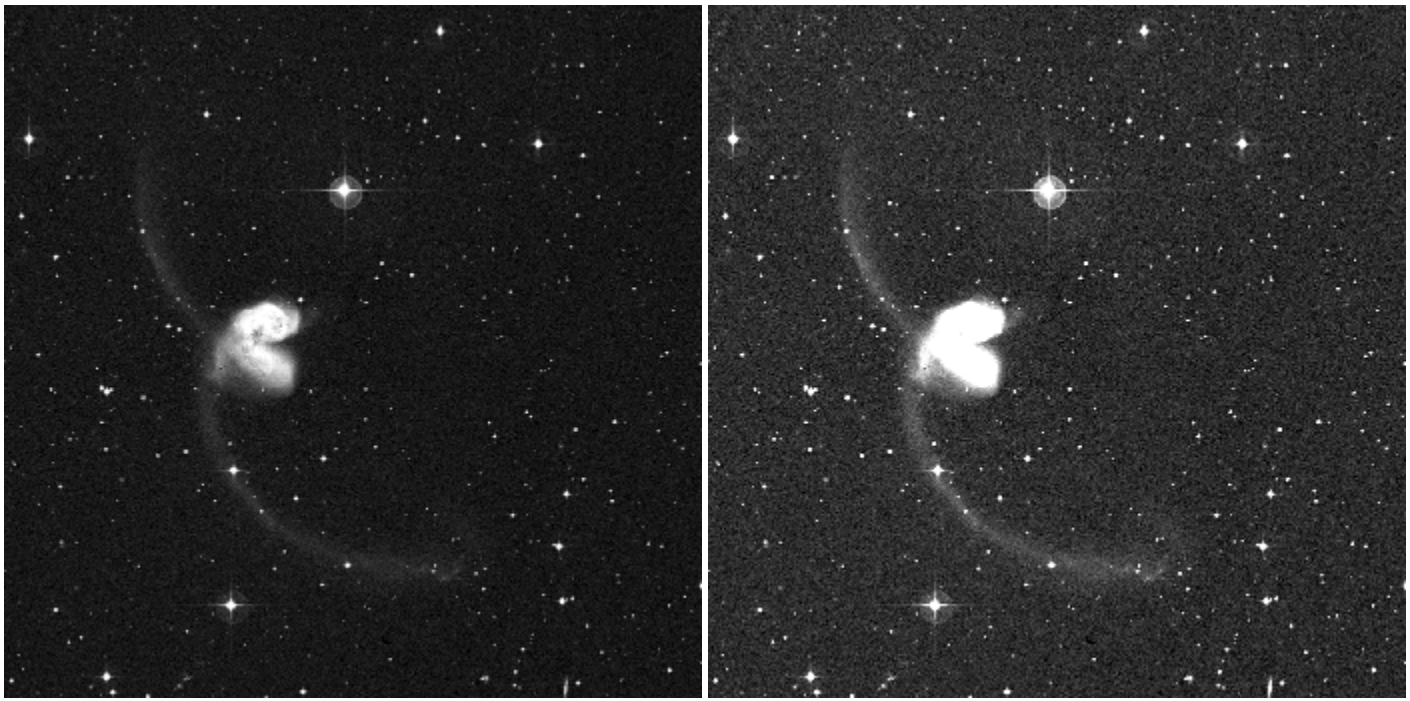
Usage: Sharpened the image.

Calculation Filters

Effect: Multiply

Description: Increases or decreases the brightness in the image by multiplying its colors with constant.

Usage: Changing image brightness.



Effect: Subtract Background

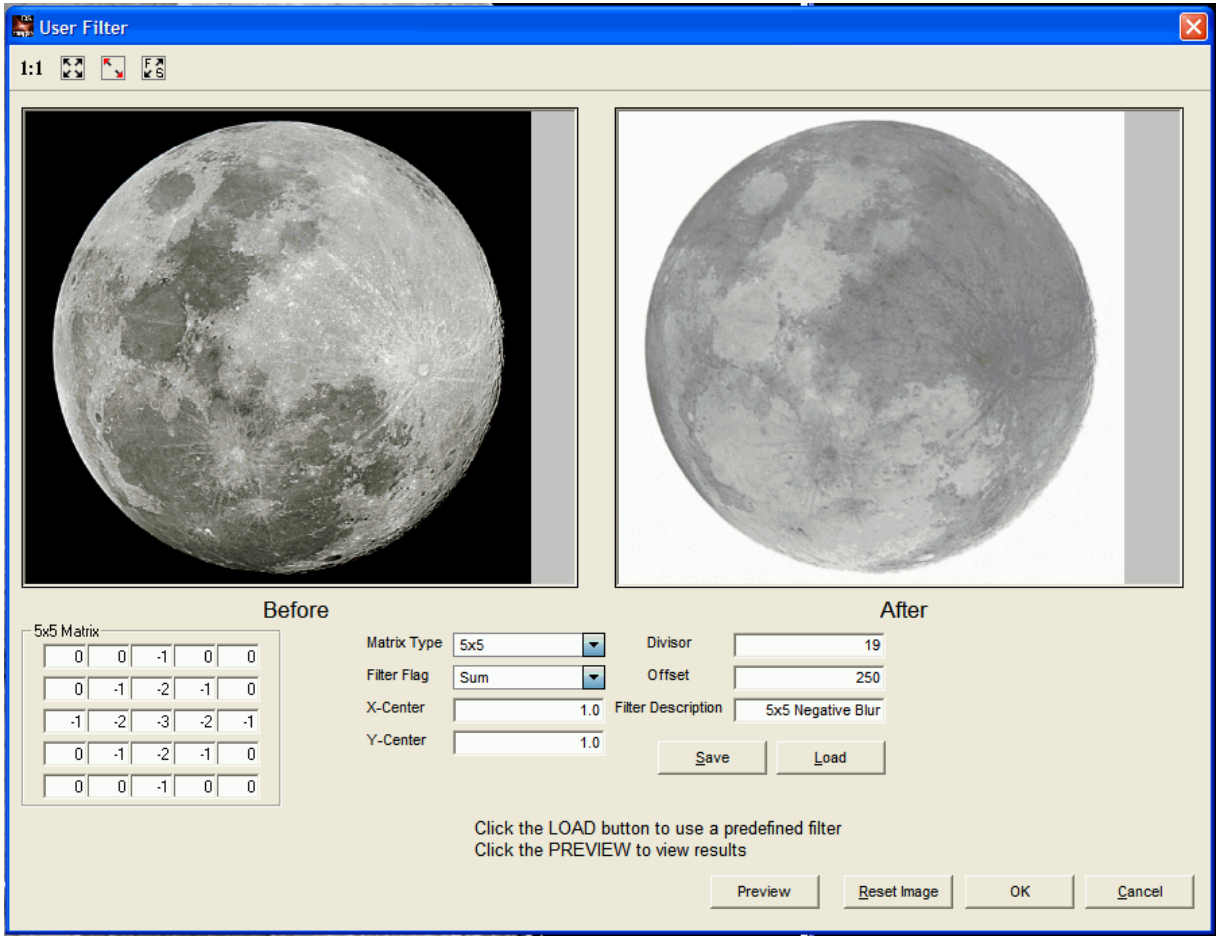
Description: Removes the background from an image

Usage: Improving the quality of the image, remove background and increase the visibility of the details

Effect: User Filter

Description: Apply filtering on the image based on specified user defined mask coefficients.

Usage: Apply user defied filter on the image



Add or Stitch Bitmaps Together

Effect: Add Bitmaps

Description: Adds or averages the images in a list

Usage: This filter can be used to remove noise, combine images, and improve night vision images. Noise can be reduced by averaging a list of images together. Adding a list of images together can be used to show details in low intensity areas of an image.

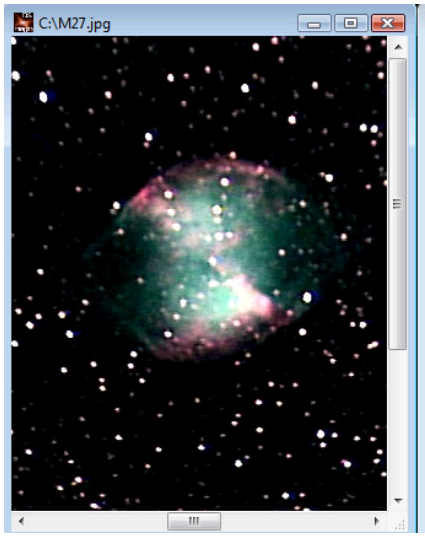


Image 1 Before

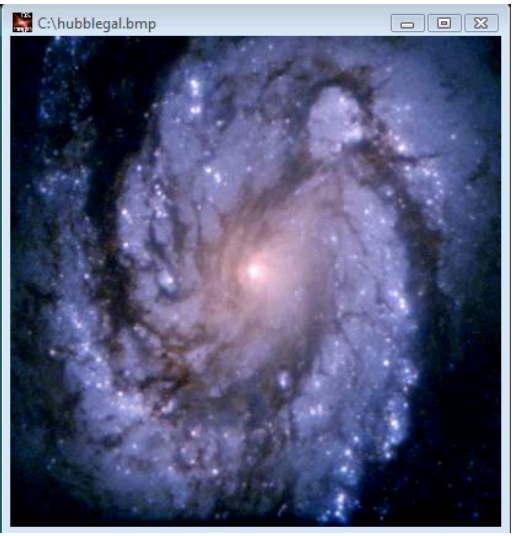


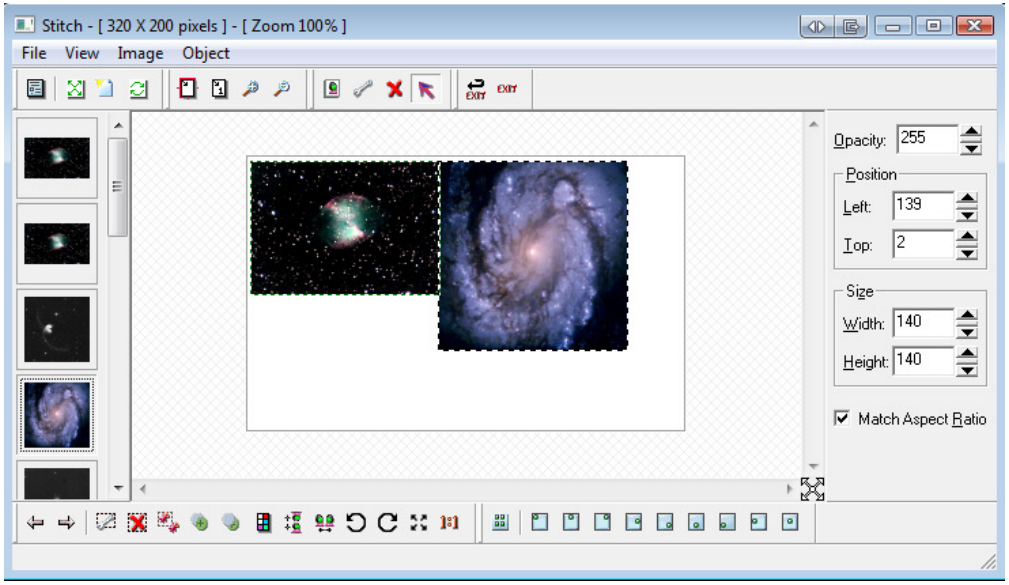
Image 2 Before

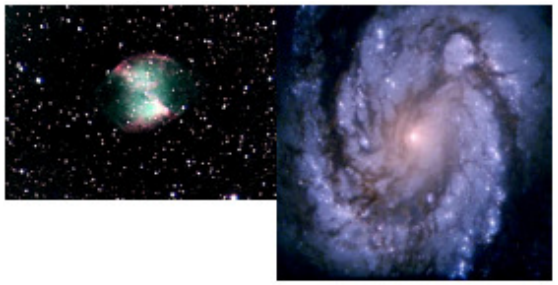
Image Combined using Average

Effect: Stitch Bitmaps Together Into 1 image

Description: Stitch multiple images making them into a single image.

Usage: Use this dialog to produce a new bitmap that is composed of 1 or more source bitmaps





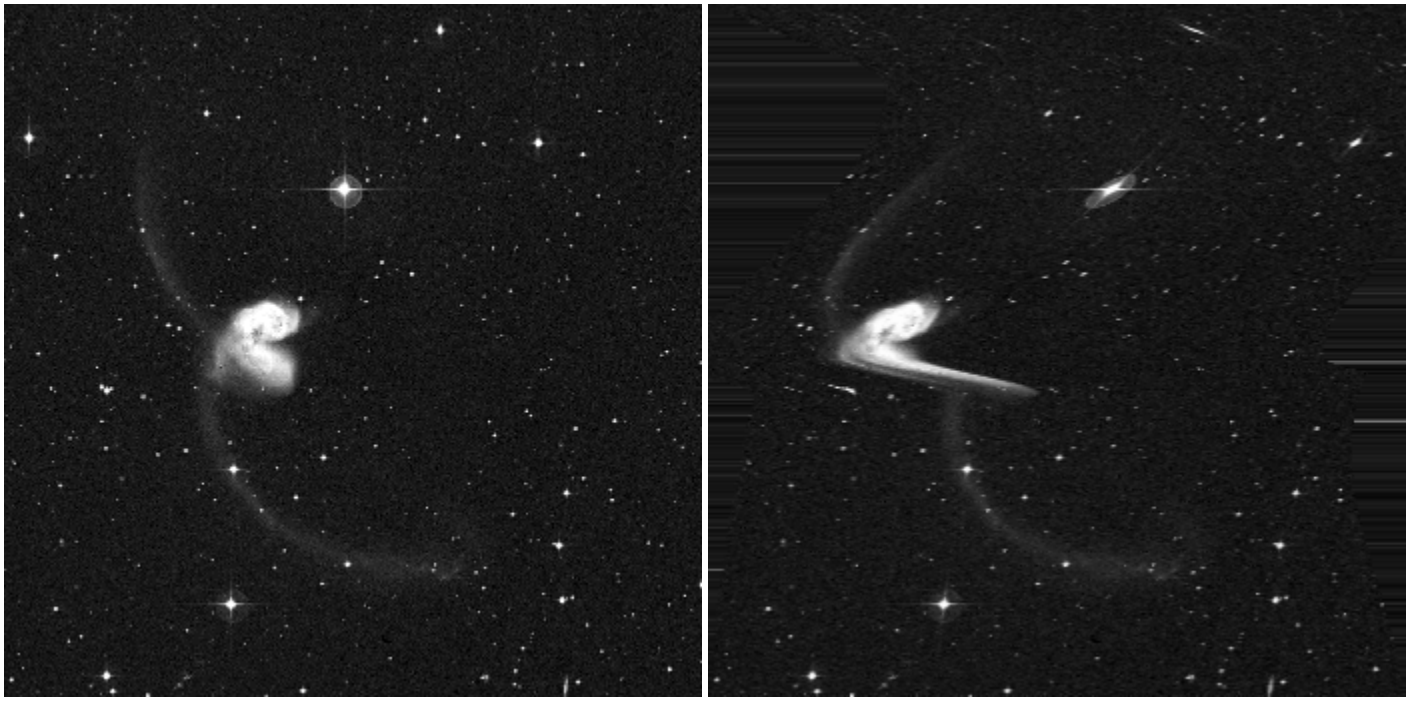
Resulting image stitched together

Distortion Effects

Effect: Free Hand Wave

Description: Distorts the image by a free hand drawn wave in any specified direction

Usage: Makes the image look like as if it is reflected on user defined waves.



Effect: Wind

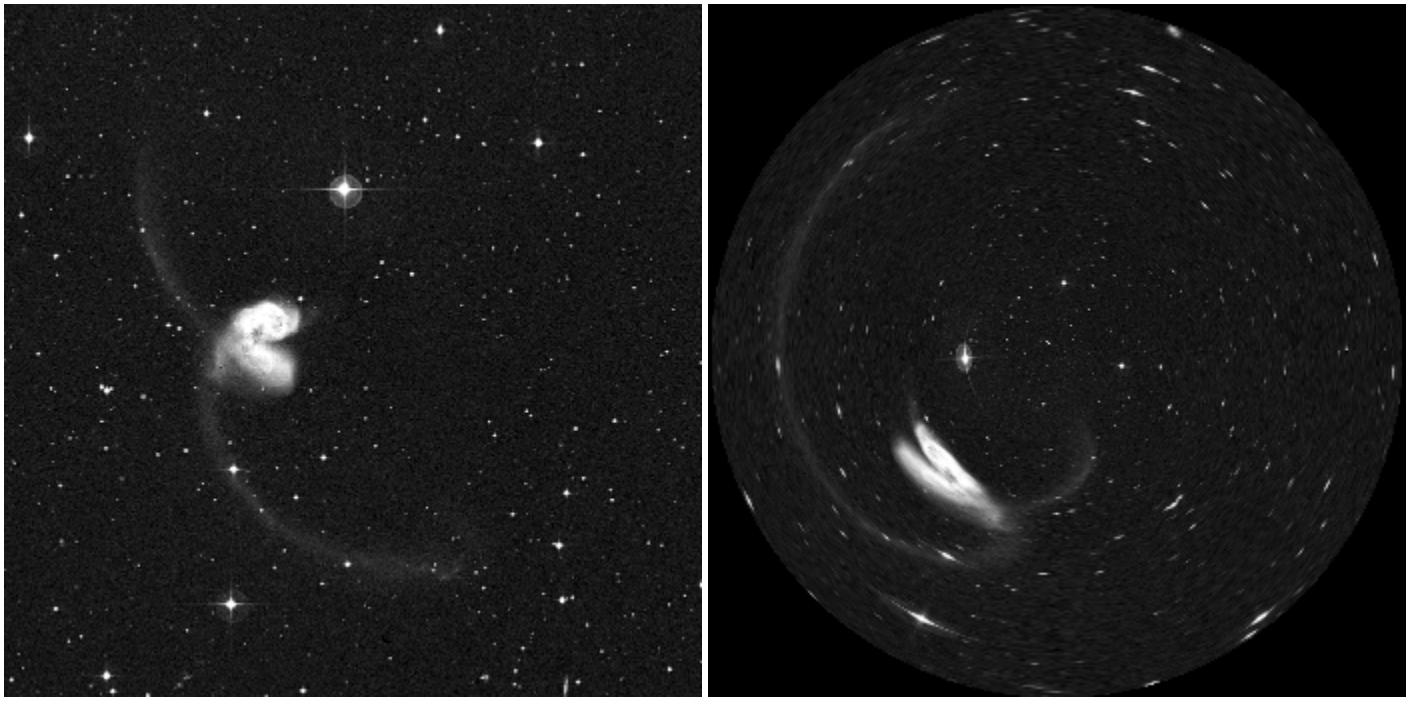
Description: Creates thin lines, directed along certain angle, on the specified image

Usage: Apply this effect on the image objects to show that it has been exposed by a direct wind.

Effect: Polar

Description: Converts the image from rectangular to polar coordinates and vice versa

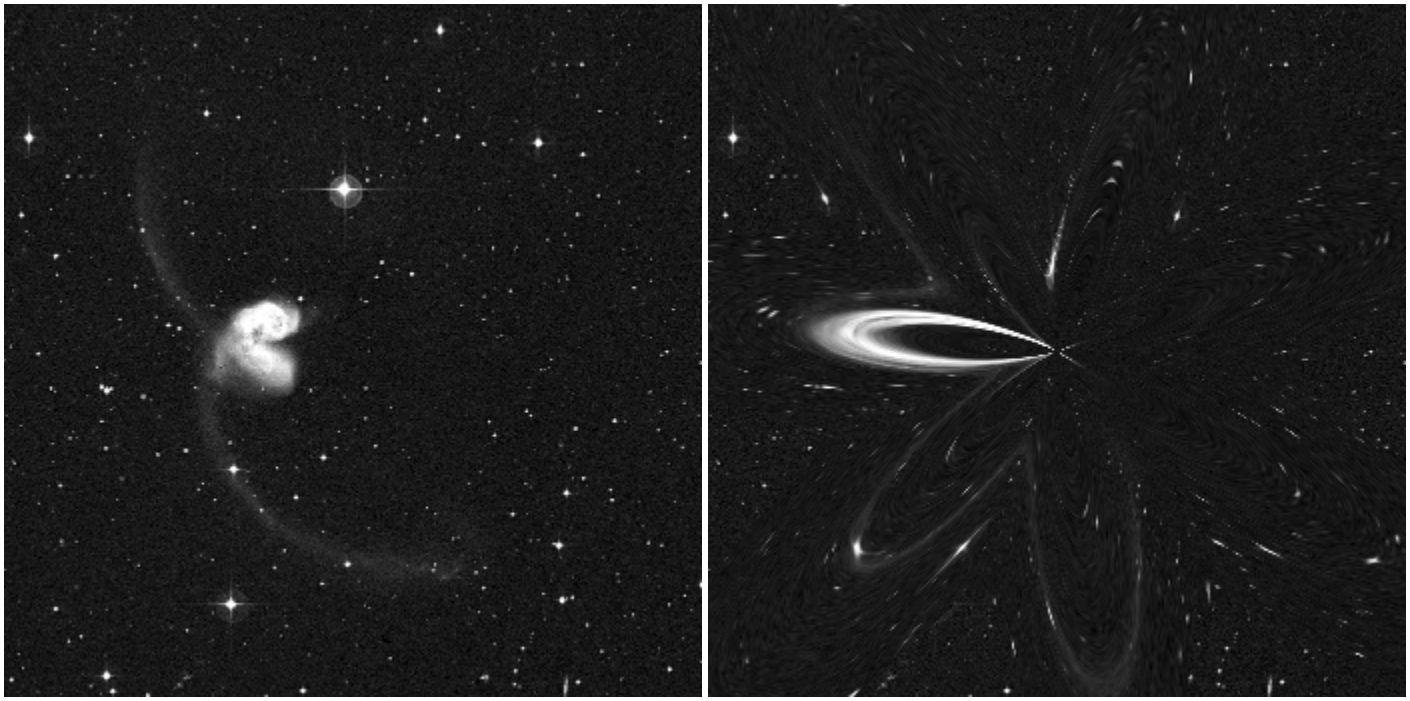
Usage: Makes the image look like as if it has been drawn on the Polar Coordinate system.



Effect: Zoom Wave

Description: Distorts the image with a wave zoomed from any specified point on the image.

Usage: Makes the image look like as if it is reflected on zoomed waves.



Effect: Radial Wave

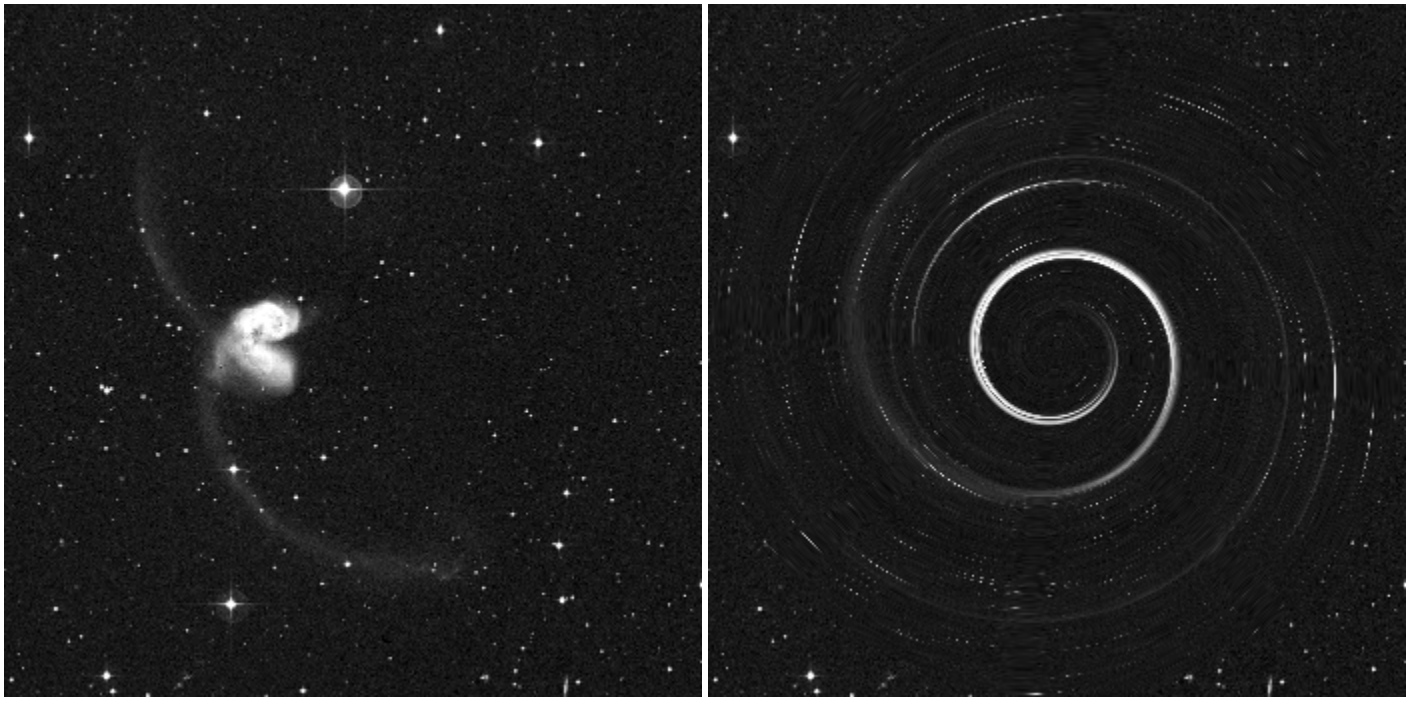
Description: Distorts an image by a radial wave radiating from any specified point on the image

Usage: Makes the image look like as if it is reflected on radial waves.

Effect: Swirl

Description: Spins the image according to the rotation angle to produce a swirl pattern

Usage: Makes the image look like as if it has been swallowed by a swirl.



Before

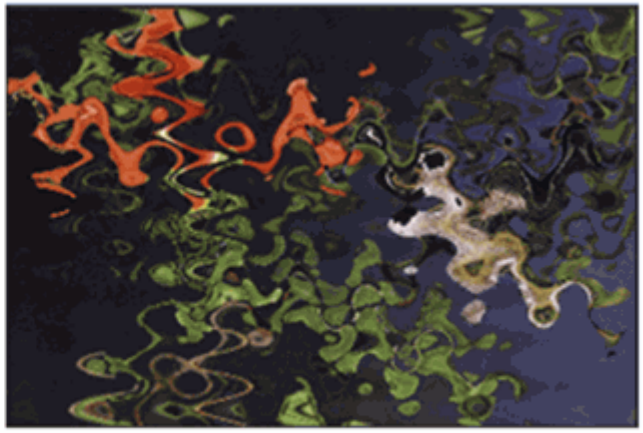
After

Effect: Wave

Description: Distorts the image with two perpendicular waves in any specified direction or shape.

Usage: Makes the image look like as if it is reflected on waves.

Before

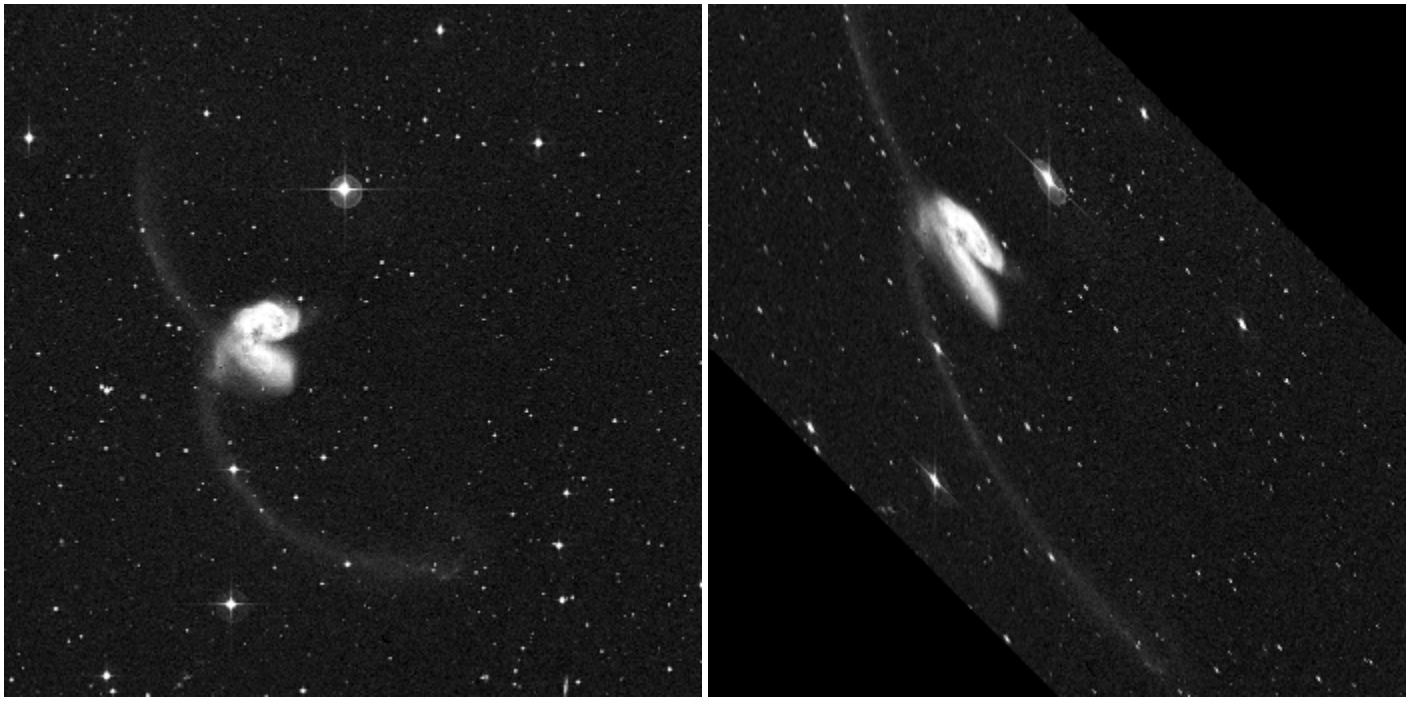


After

Effect: Wave Shear

Description: Shears the image by the wave drawn

Usage: Produces an image that has been sheared vertically or horizontally or both.



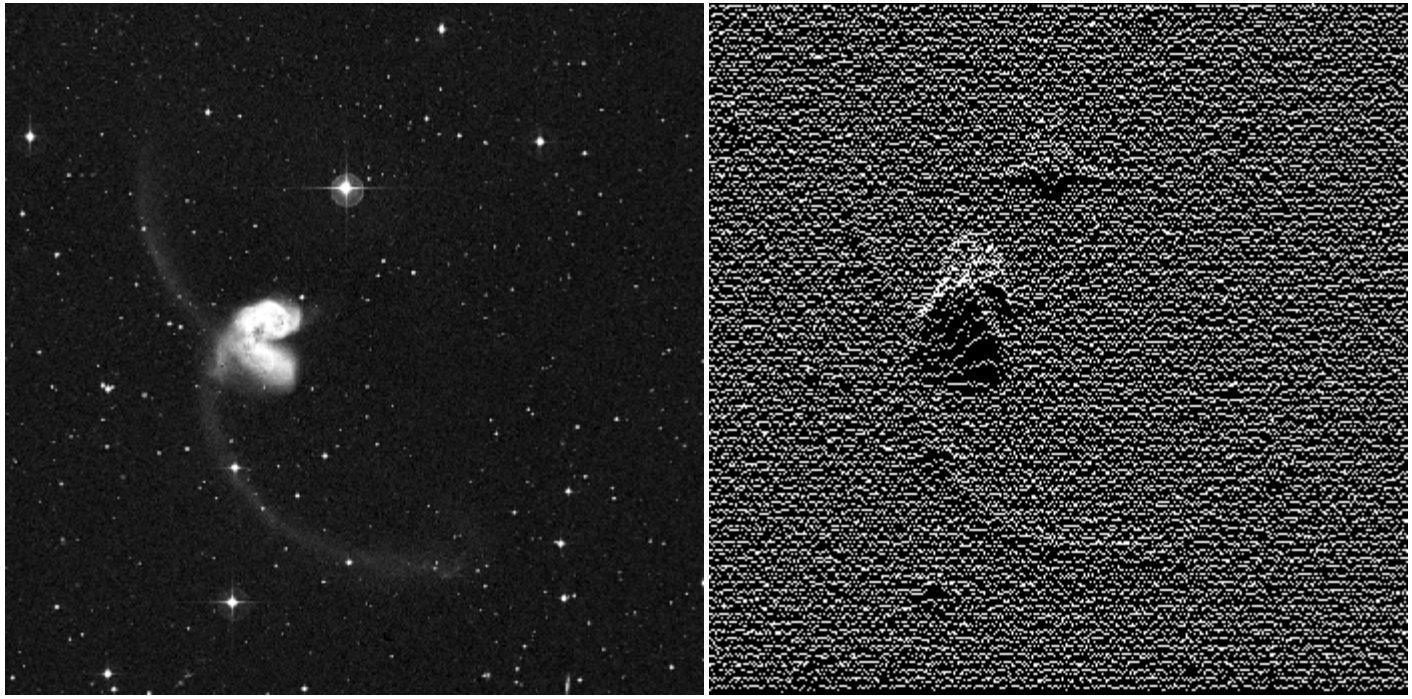
Before

After

Effect: Rev Effect

Description: Creates a pseudo 3D wave effect based on the brightness along each line

Usage: Simulation of a wave monitor



Effect: Ocean

Description: Reflects the image on an ocean surface.

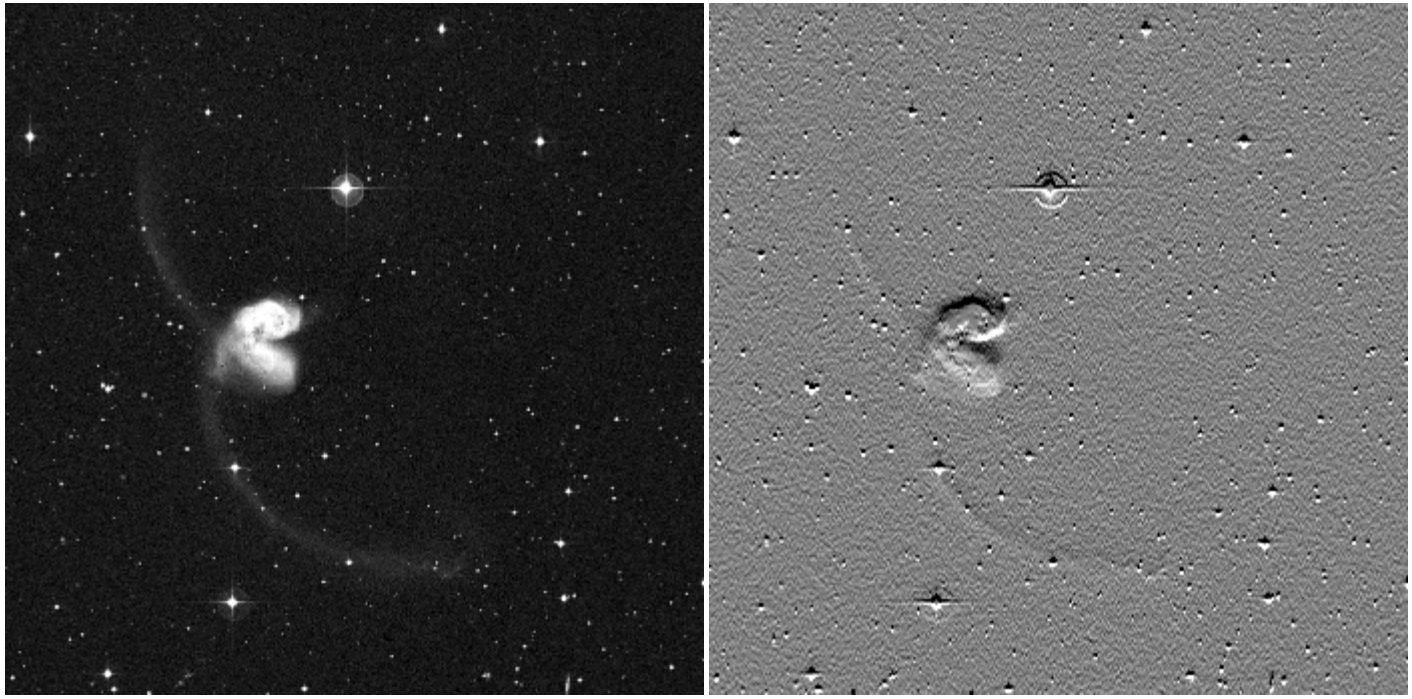
Usage: Make the image as Reflected on an ocean surface.

3-D Effects

Effect: Emboss

Description: Applies an emboss effect to an image, letting you specify the depth and direction of the effect.

Usage: Creating a 3D view (highlight the edges by 3D effect).



Effect: Punch

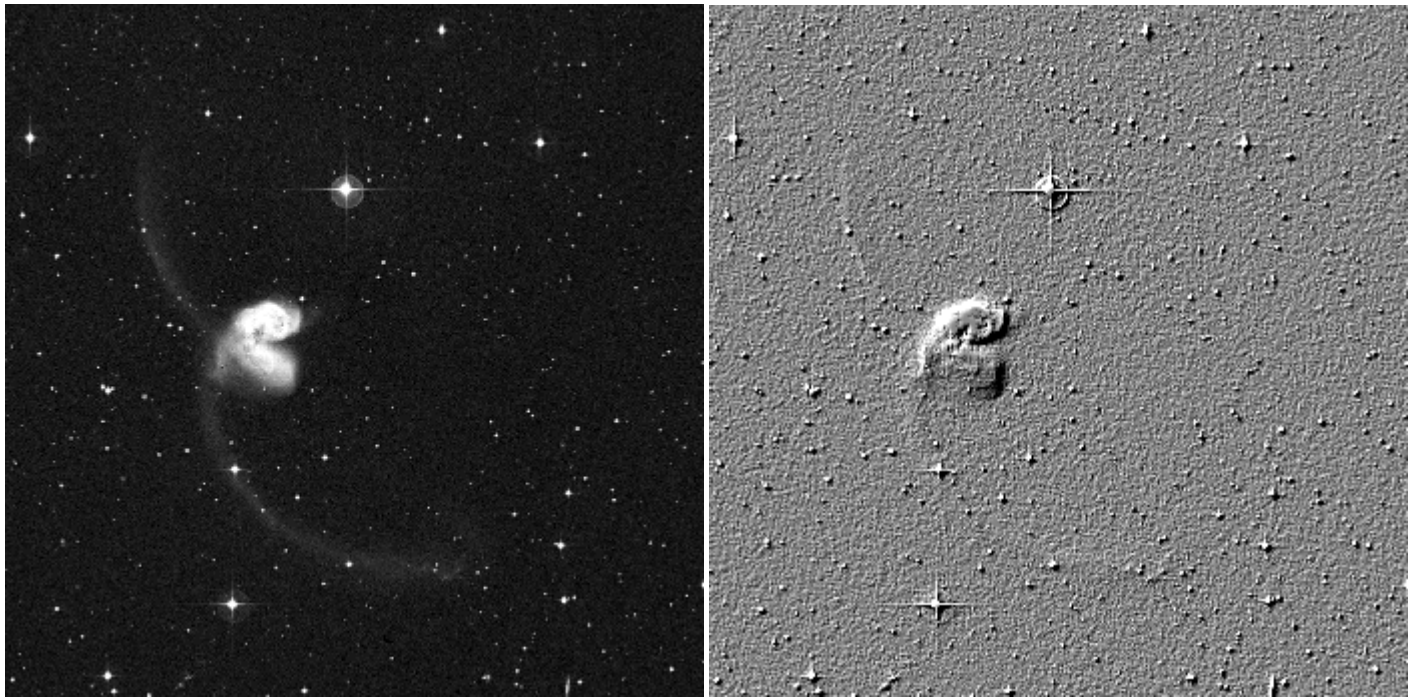
Description: Warps the image by pinching it toward the center or expanding the image away from its center

Usage: Makes the image look like as if it has been punched.

Effect: Mask Convolution (emboss)

Description: When an image undergoes image convolution each pixel of the image, is multiplied by a mask to create a new pixel value. The mask is an array of values that describes the weight that should be given to each of the pixels surrounding a specific pixel. The new pixel value is the result of the mask sum being divided by the mask weight. Using different masks result in different alterations of the image.

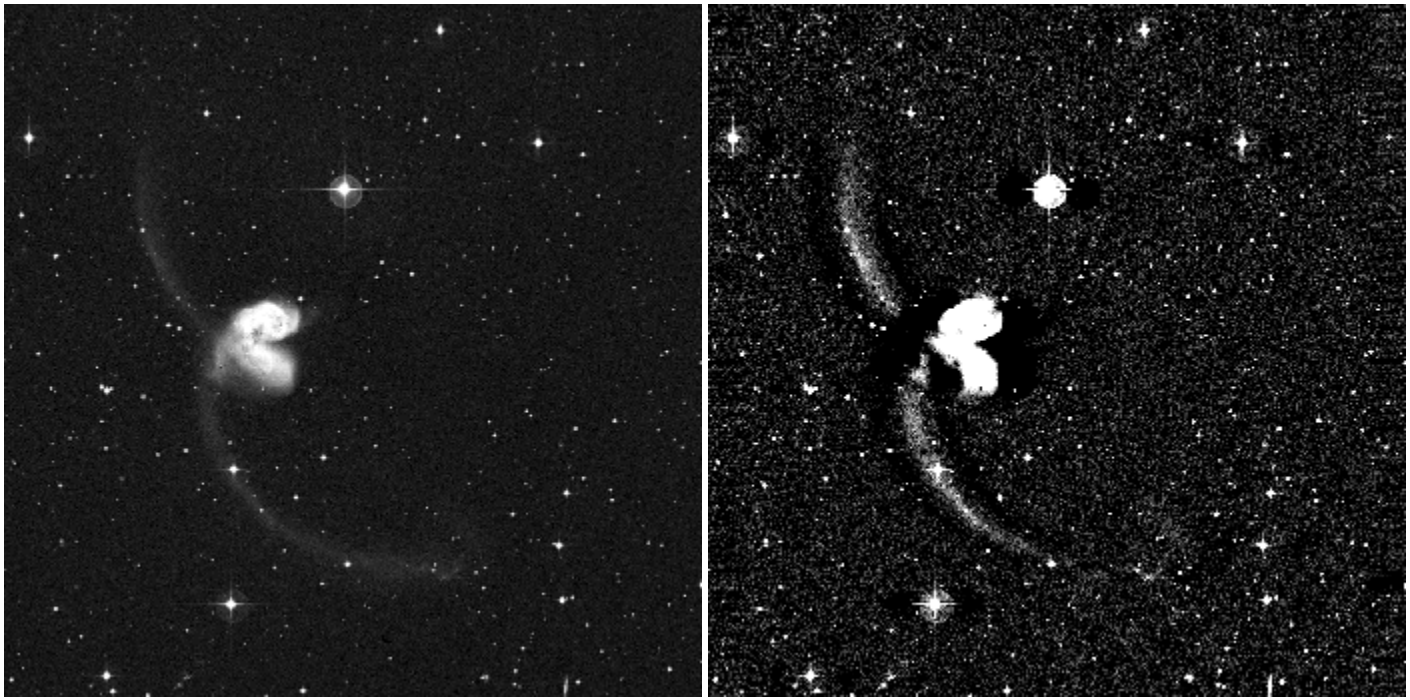
Usage: For applying various 3D effects to the image



Effect: Mask Convolution (edge)

Description: When an image undergoes image convolution each pixel of the image, is multiplied by a mask to create a new pixel value. The mask is an array of values that describes the weight that should be given to each of the pixels surrounding a specific pixel. The new pixel value is the result of the mask sum being divided by the mask weight. Using different masks result in different alterations of the image.

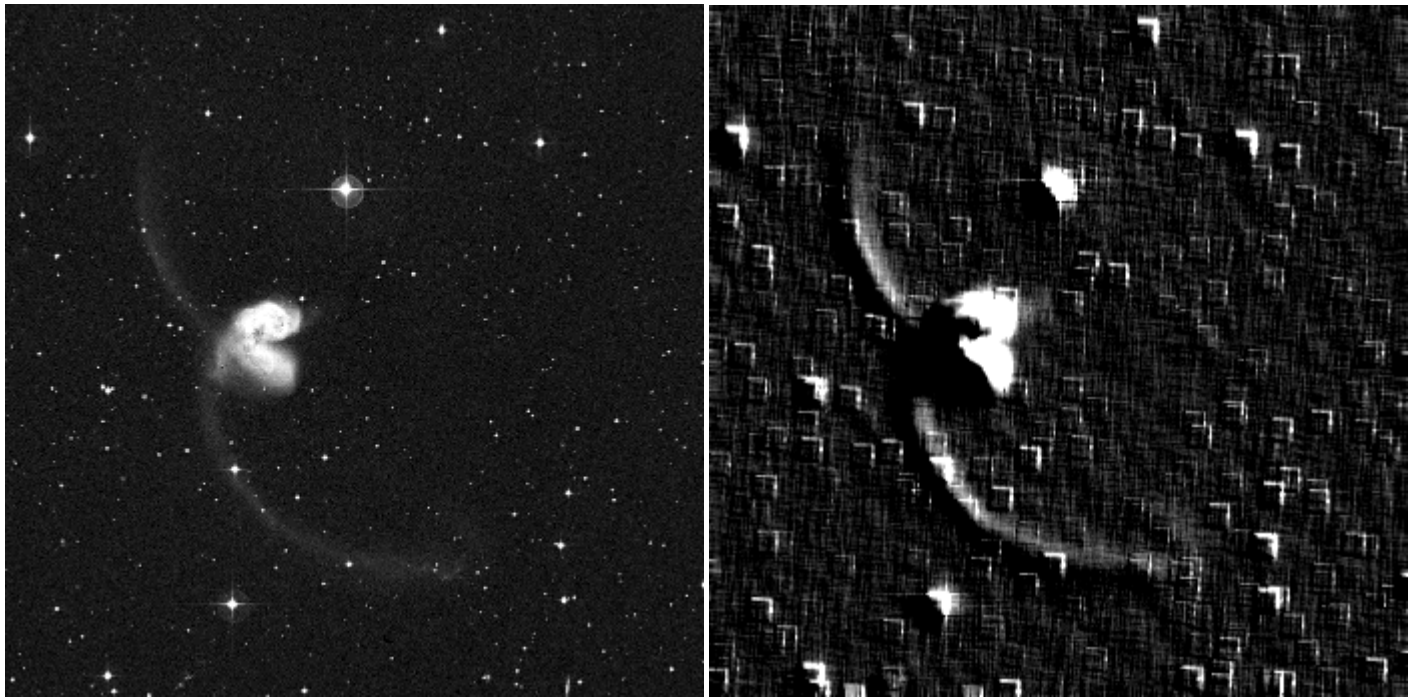
Usage: For applying various 3D effects to the image



Effect: Mask Convolution (splotch)

Description: When an image undergoes image convolution each pixel of the image, is multiplied by a mask to create a new pixel value. The mask is an array of values that describes the weight that should be given to each of the pixels surrounding a specific pixel. The new pixel value is the result of the mask sum being divided by the mask weight. Using different masks result in different alterations of the image.

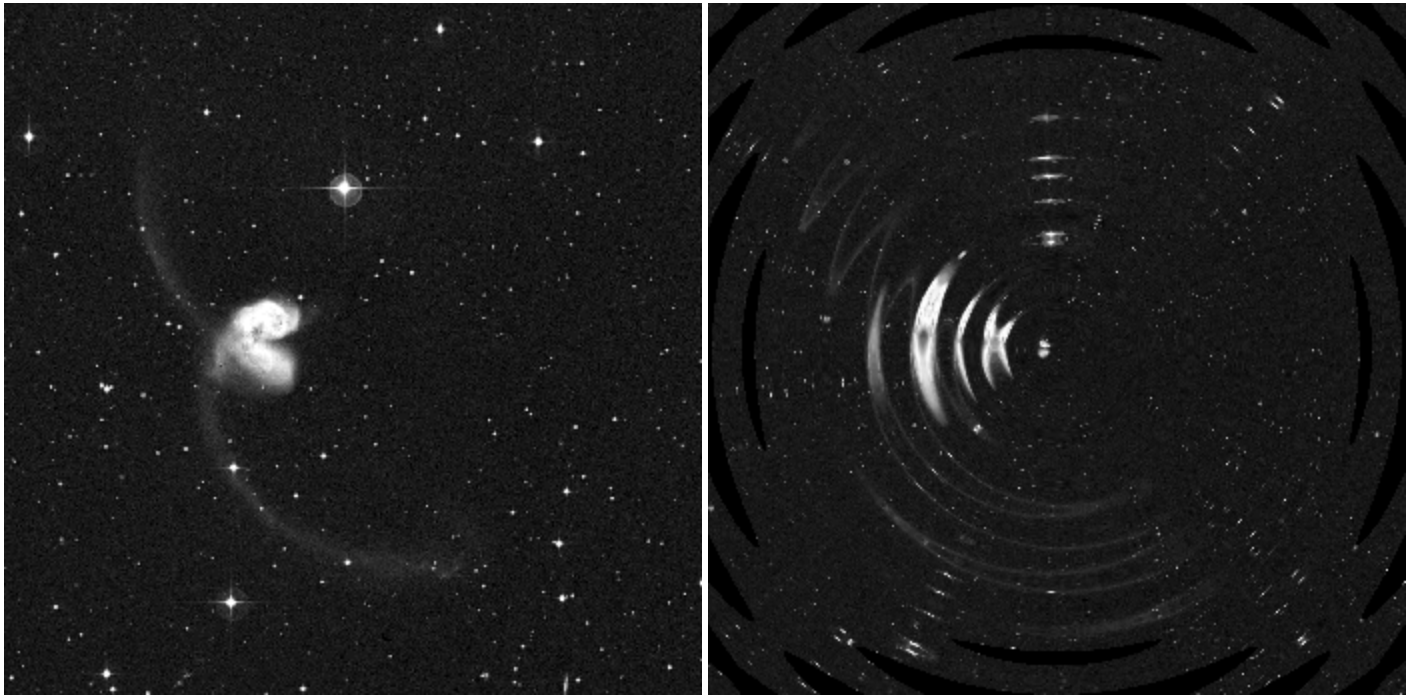
Usage: For applying various 3D effects to the image



Effect: Ripple

Description: Warps the image in concentric rings

Usage: Makes the image look like as if it is reflected on water ripples.



Effect: Bending

Description: Warps the active image along a curved plane, centered on the pivot point.

Usage: Makes the image look like as if it has been bent.

Effect: Cylindrical

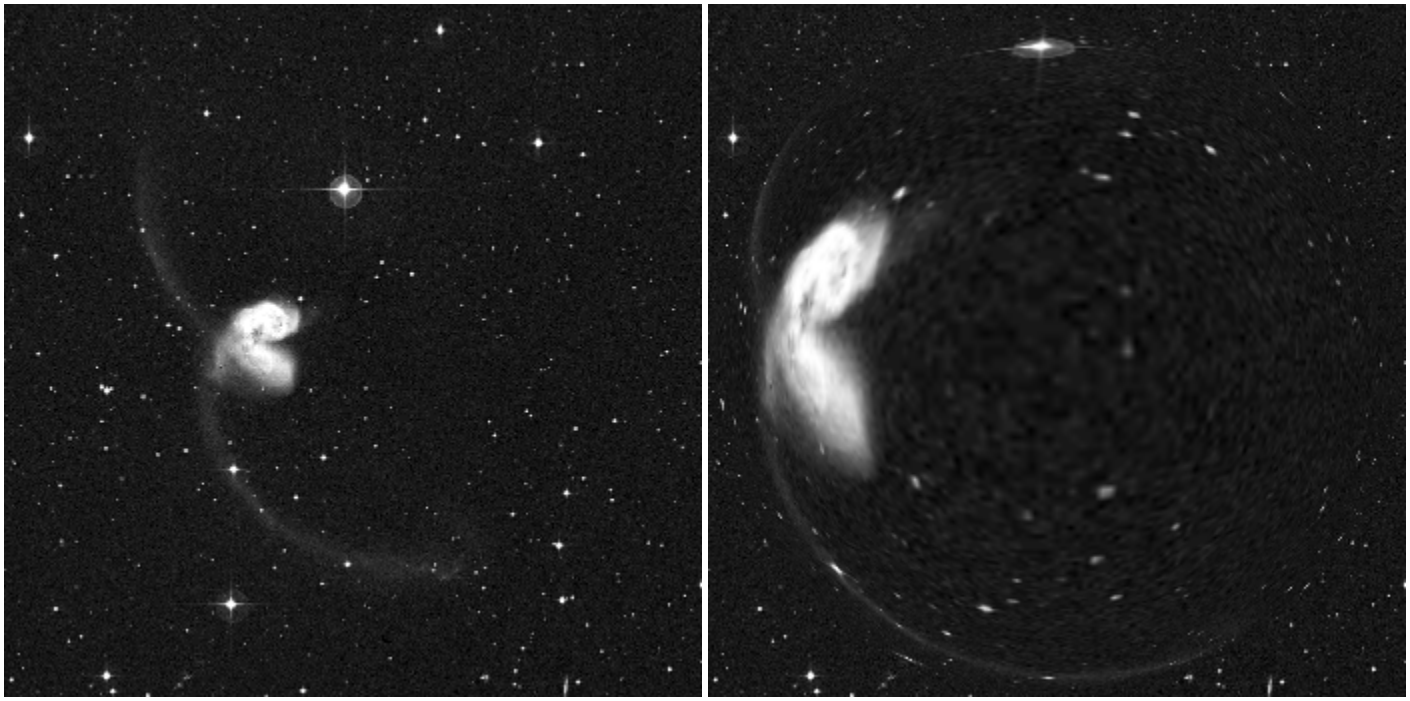
Description: Warps the image around a cylinder.

Usage: Makes the image look like as if it has been wrapped around a cylinder.

Effect: Spherize

Description: Warps the image around a 3D spherical shape

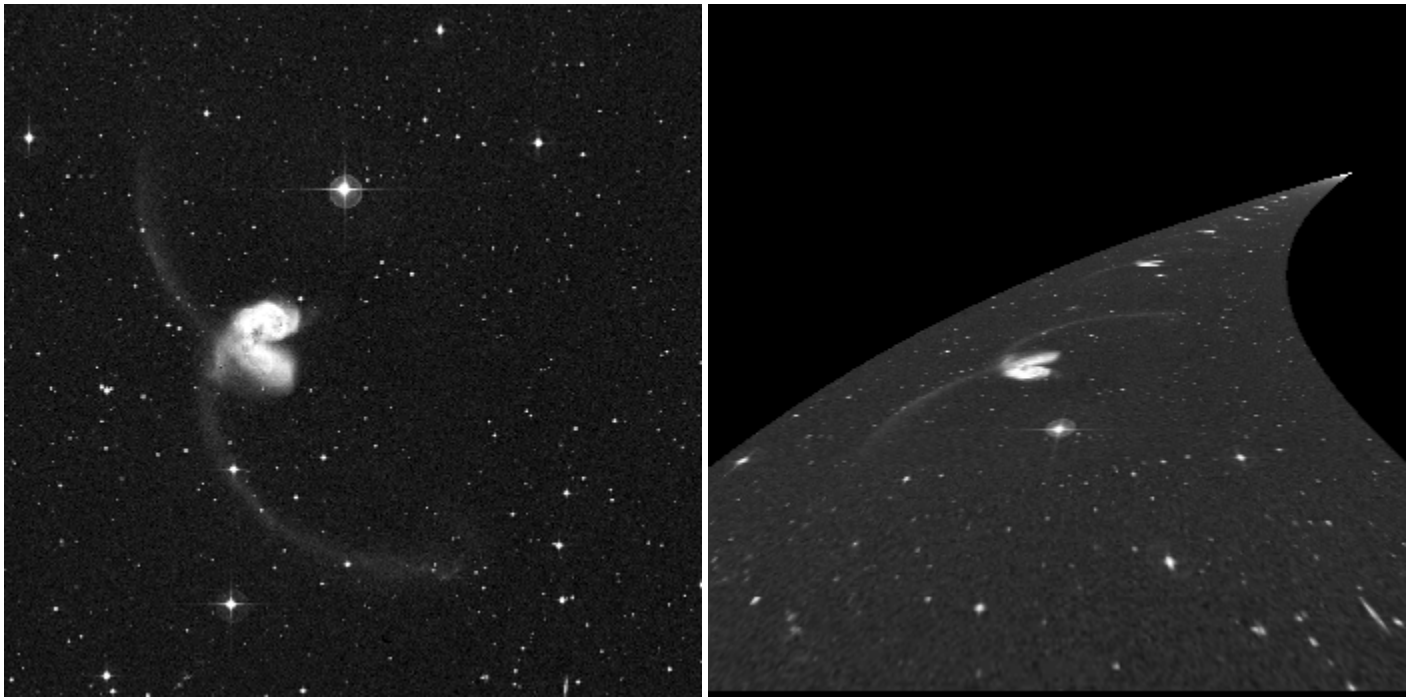
Usage: Makes the image look like as if it has been viewed through a spherical glass.



Effect: Plane Bend

Description: Places the image on parallel planes along the Z-axis bended toward the center point

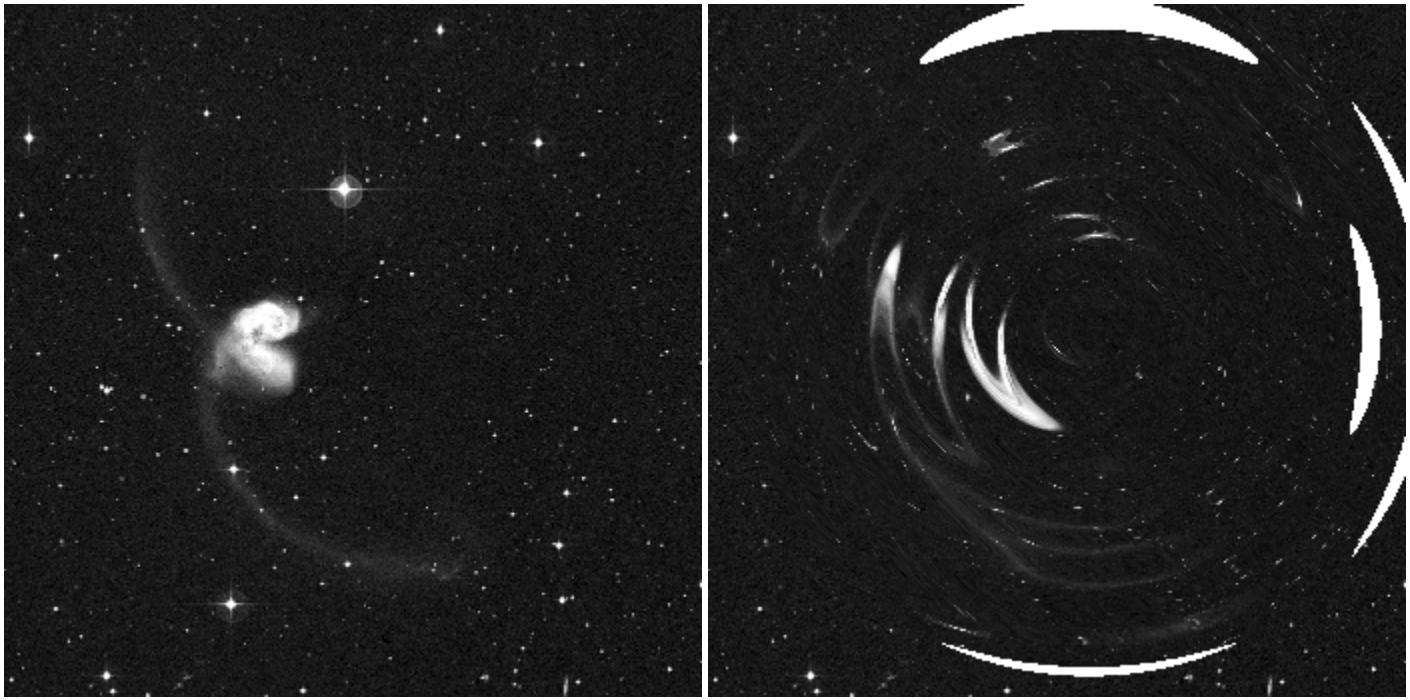
Usage: Places the image on parallel planes along the Z-axis bended toward the center point



Effect: ZigZag

Description: Radially distorts the image by creating waves that twist the image around a specified center.

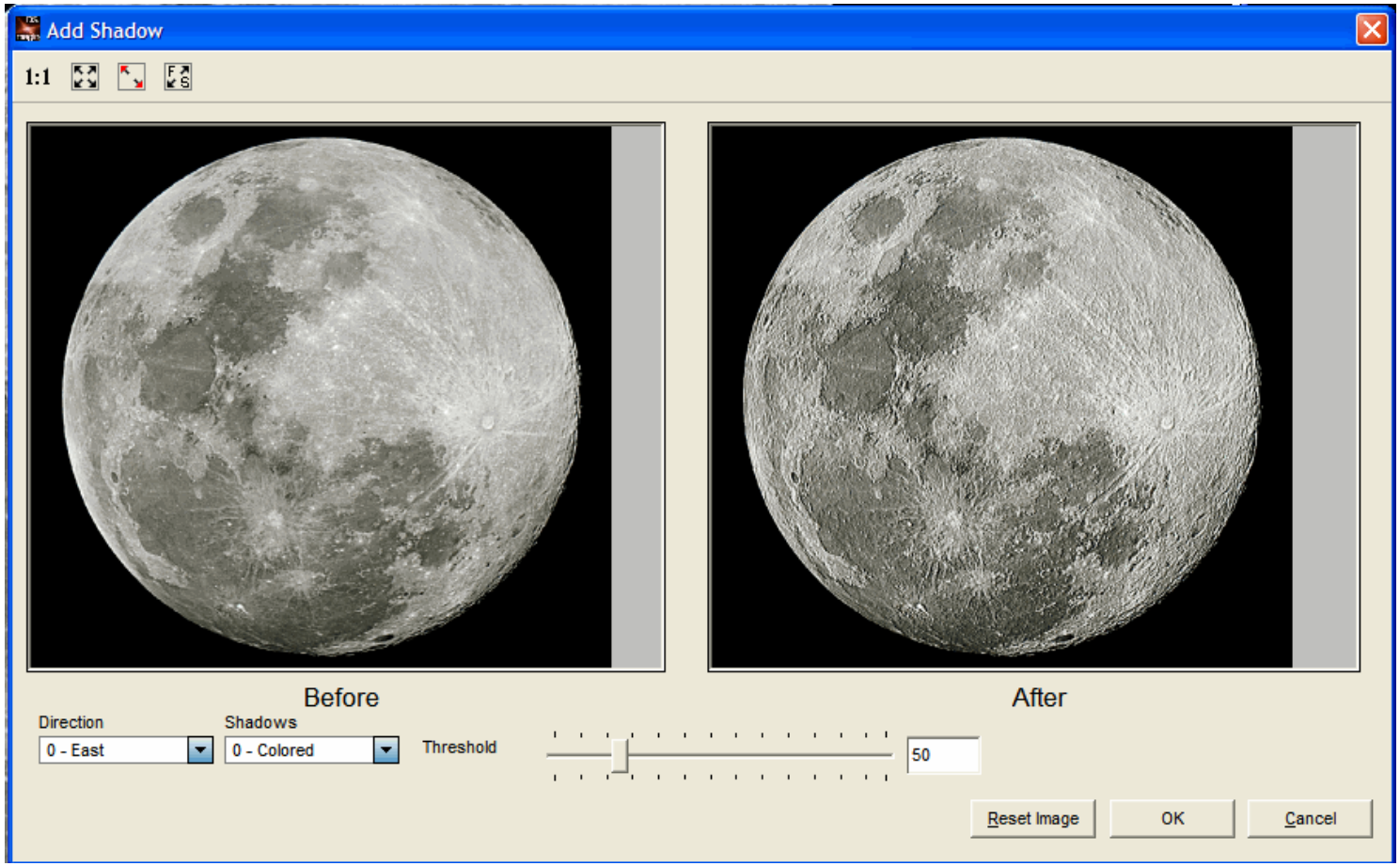
Usage: Add zigzag-like distortions to the image.



Effect: Add Shadow

Description: Adds Shadow to the image

Usage: Simulation of a light source that reflects a shadow

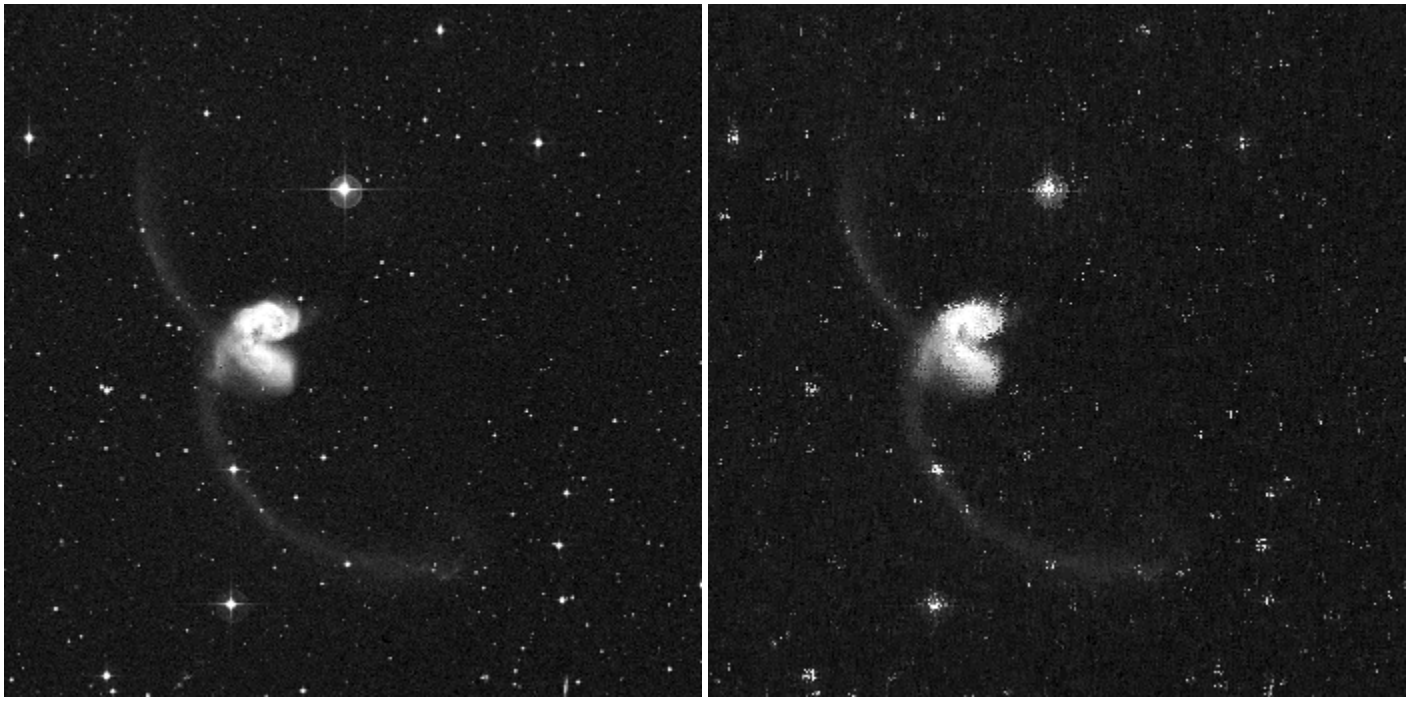

Add Shadow
1:1
Before
After
Direction
0 - East
Shadows
0 - Colored
Threshold
50
Reset Image
OK
Cancel

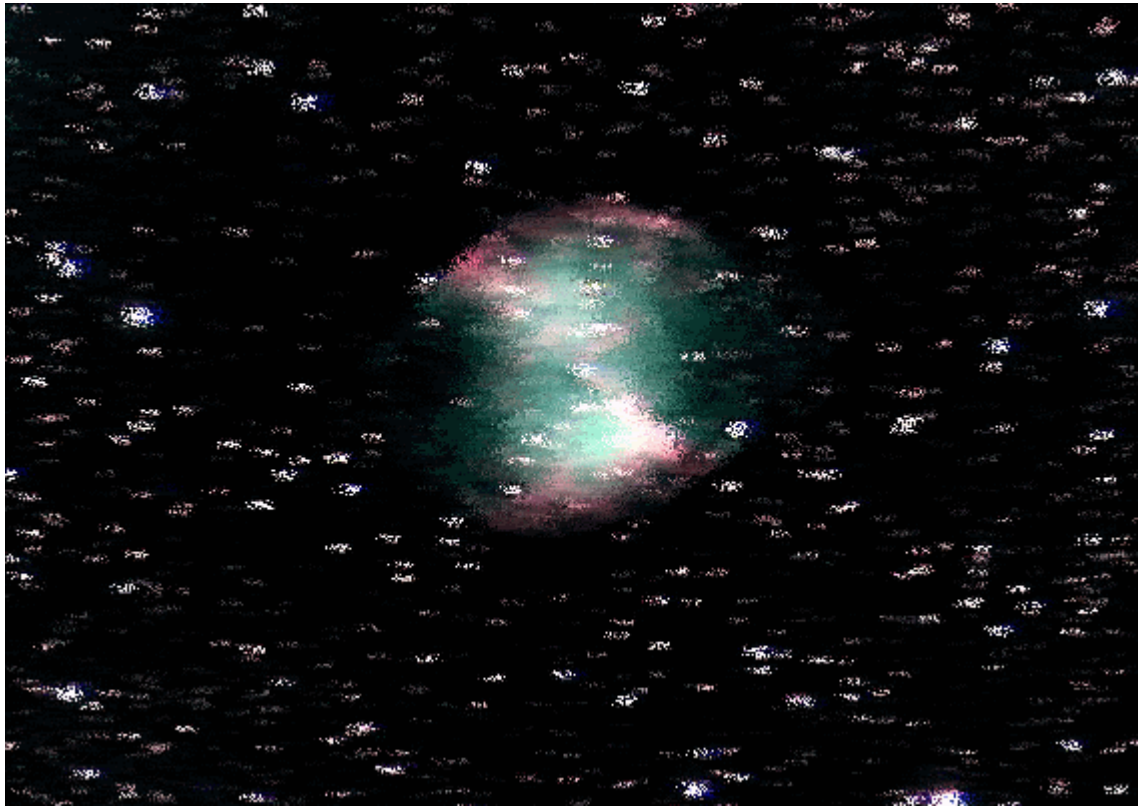
Artistic Effects

Effect: Impressionist

Description: Makes an image looks like as if painted by an impressionist painter

Usage: Makes the image to look as if painted by an impressionist painter





Effect: Oilify

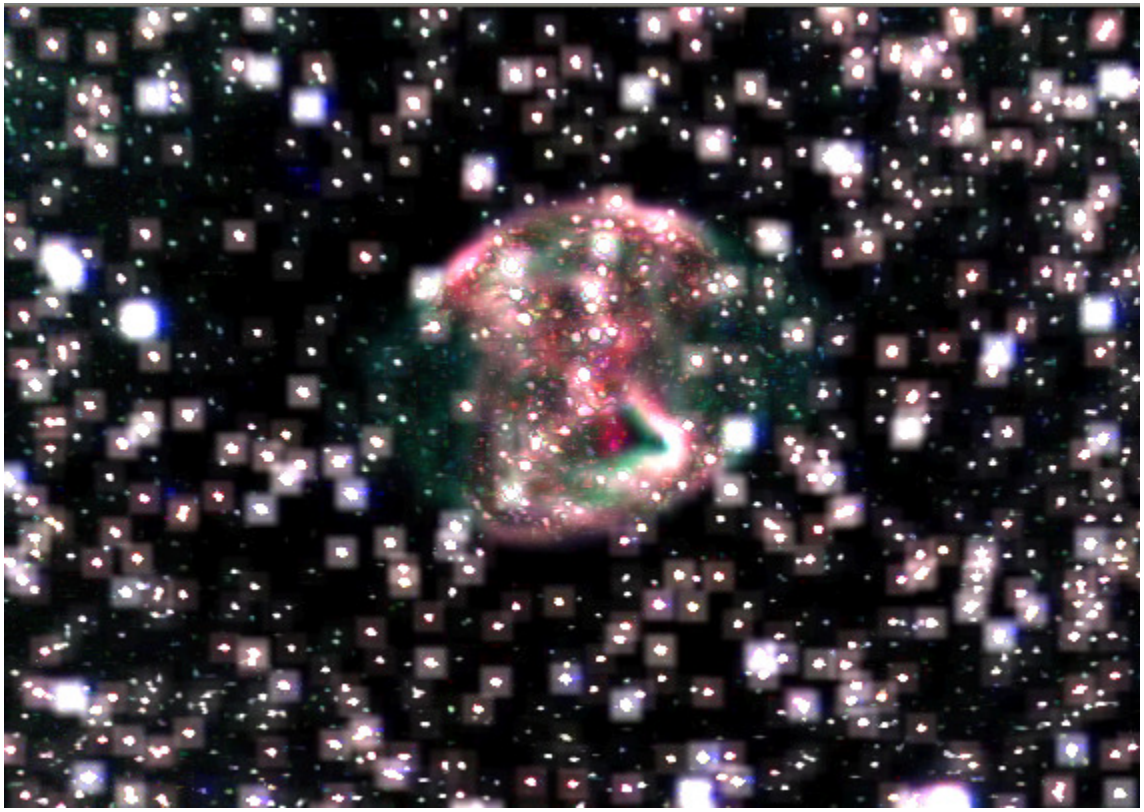
Description: Applies an oil-painting effect to the image

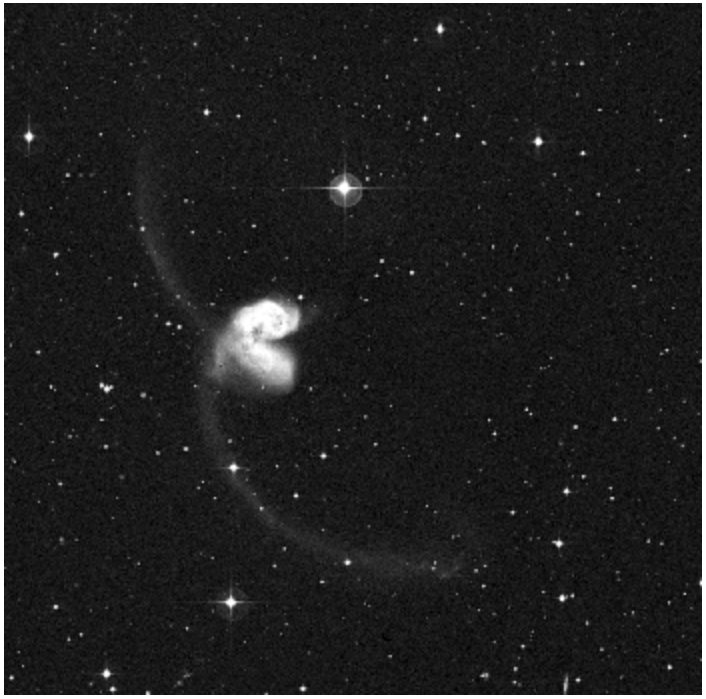
Usage: Produce an artistic effect for a fine arts or commercial project.

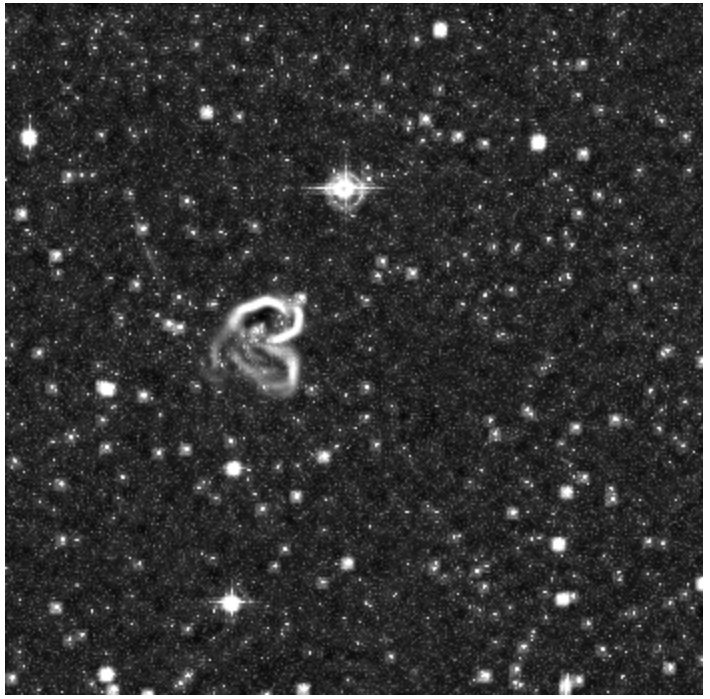
Effect: Glow

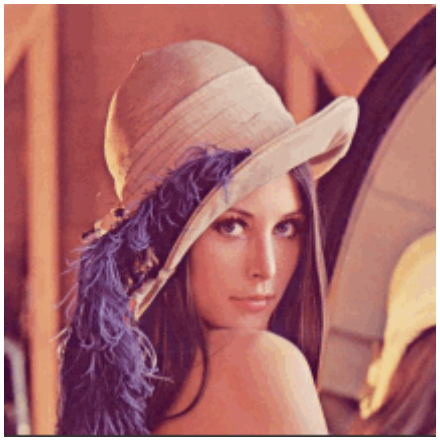
Description: Makes the colored edges shine with a neon glow.

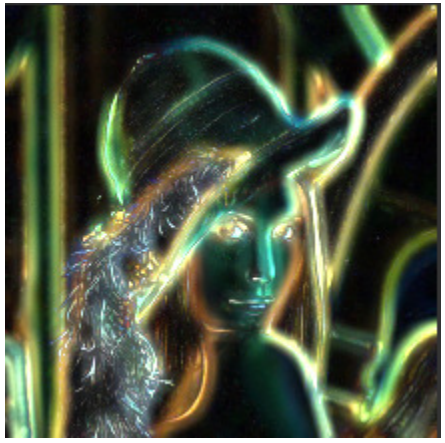
Usage: Detect image edges and give them an artistic look.







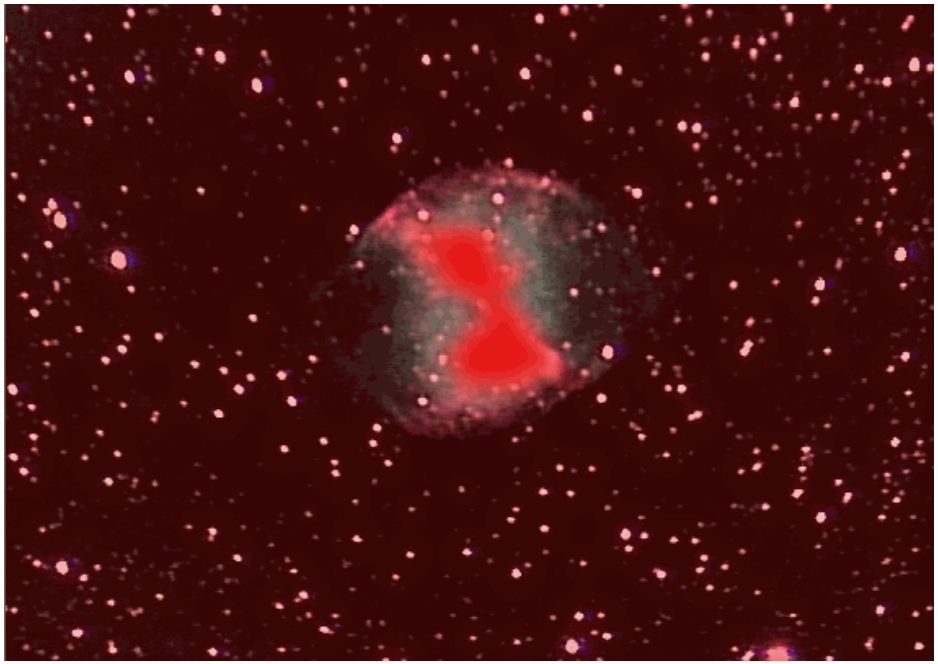




Effect: Diffuse Glow

Description: Adds a colored glow to an image's light or dark areas, making these areas shine with a neon glow.

Usage: Add glow and some noise to the image



Effect: Dry

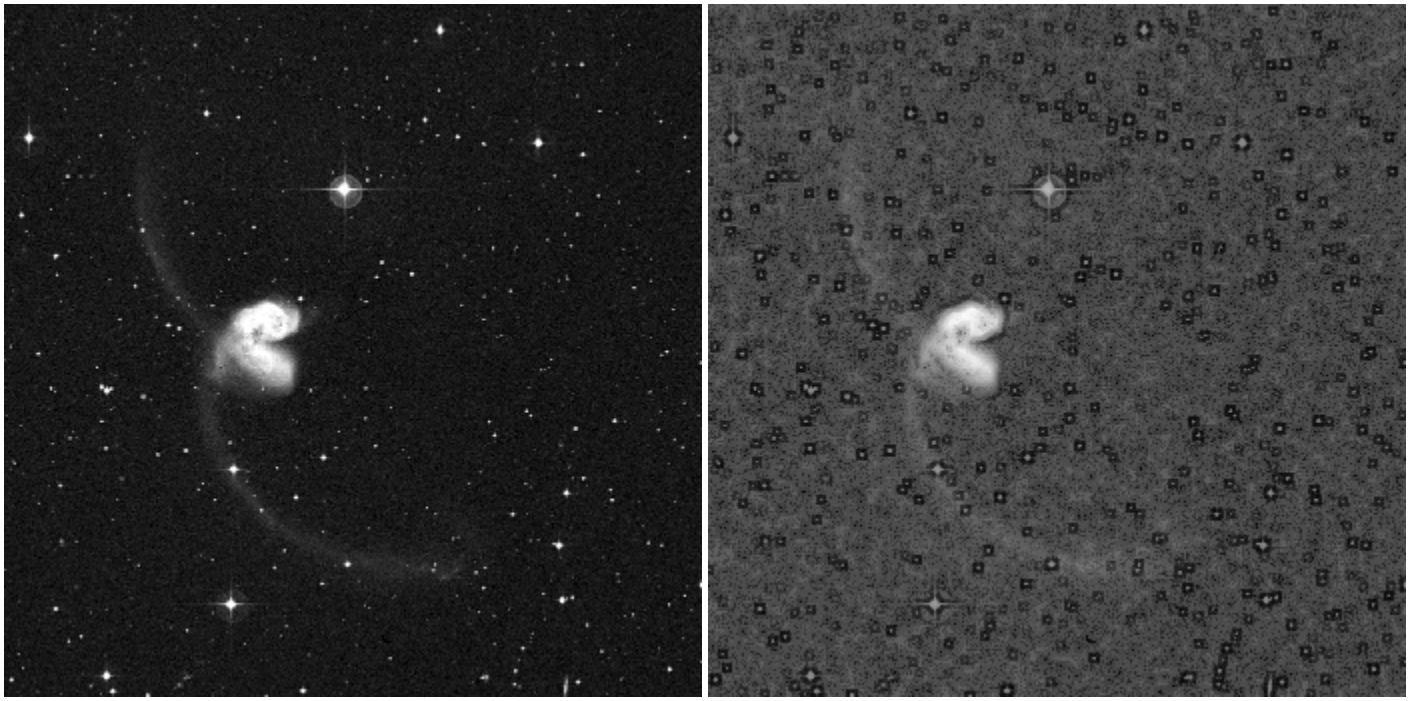
Description: This function simulates what would happen if the image had just been painted with paints and the paints were allowed to dry

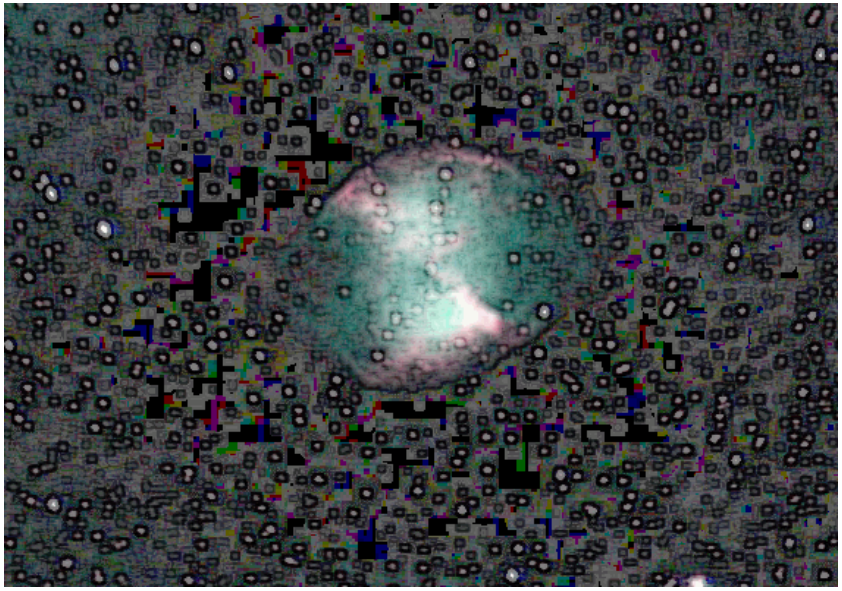
Usage: Reduce the image colors to make it as a dried painting to produce an artistic effect for a fine arts or commercial project

Effect: Colored Pencil

Description: Applies an effect to an image that makes it look like it has been drawn with colored pencils

Usage: Applies an artistic effect to a image that makes it look like it has been drawn with colored pencils





Effect: Clouds

Description: Applies the cloud effect on the image by generating clouds according to a given seed value

Usage: Add cloud texture to the image

Effect: Lens Flare

Description: Simulates the secondary reflections caused when bright lights are facing the camera lens. The lens flare is refracted into a series of lightened circles that surround the flare center point.

Usage: Simulates the effect of light strokes camera lens; produces an artistic effect for a fine arts or commercial project

Effect: Pointillist

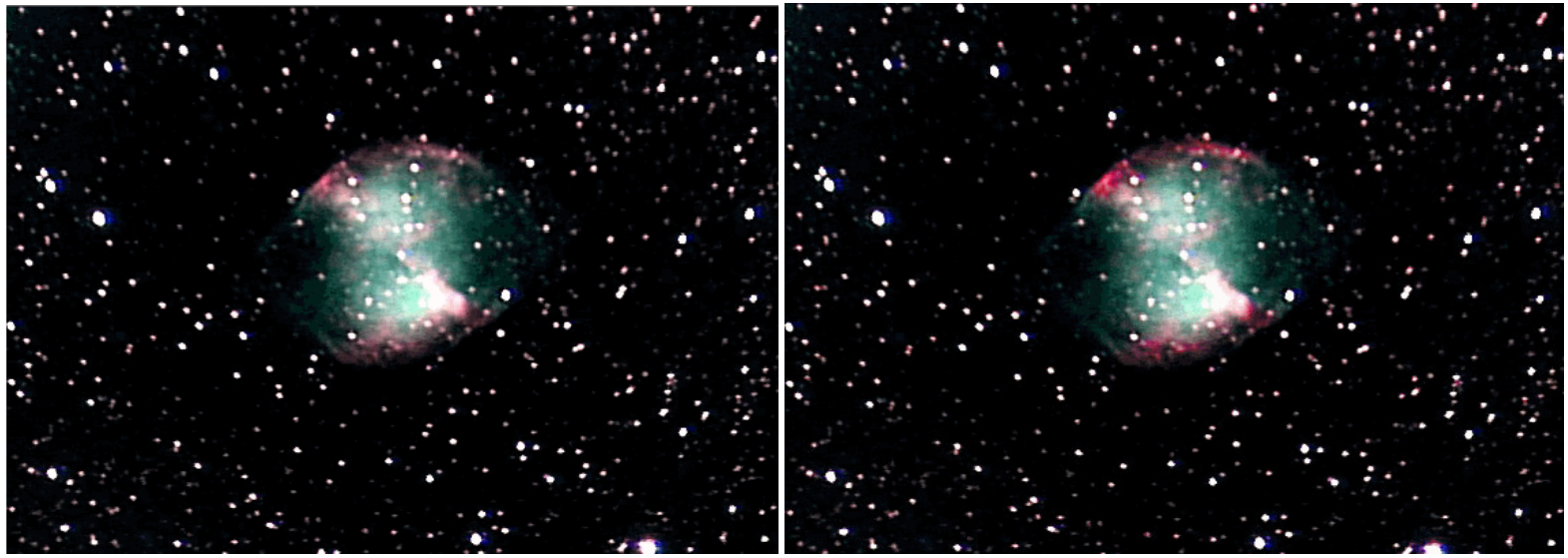
Description: Converts image colors into randomly placed dots to create a pointillist painting, and uses the background color to fill the area between dots.

Usage: Create a pointillist painting

Effect: Color Replace

Description: Replace specified colors by adjusting new value of hue, saturation and brightness

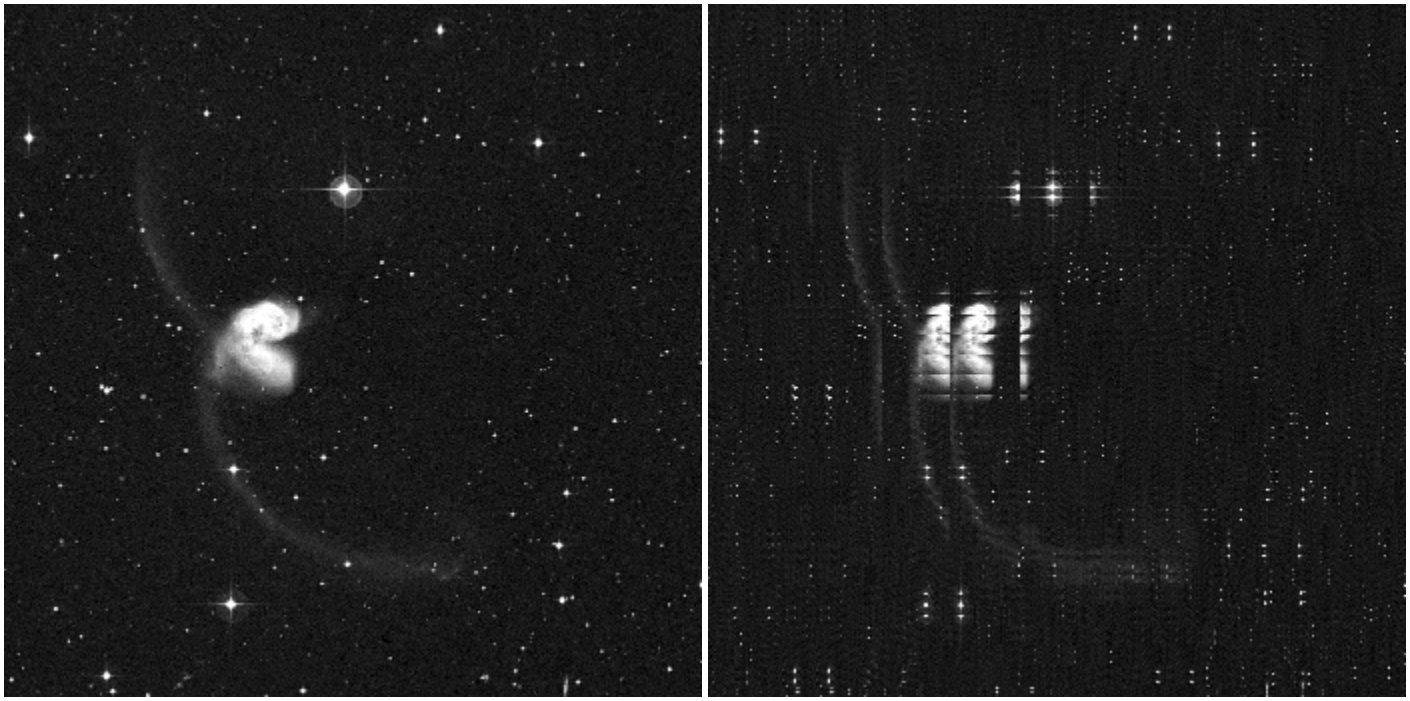
Usage: To change certain color in the image to other selected color.



Effect: Glass

Description: Divides the image into cells and makes it look as if it is being viewed through glass blocks

Usage: Simulates the effect of the image being viewed through glass blocks



Effect: Vignette

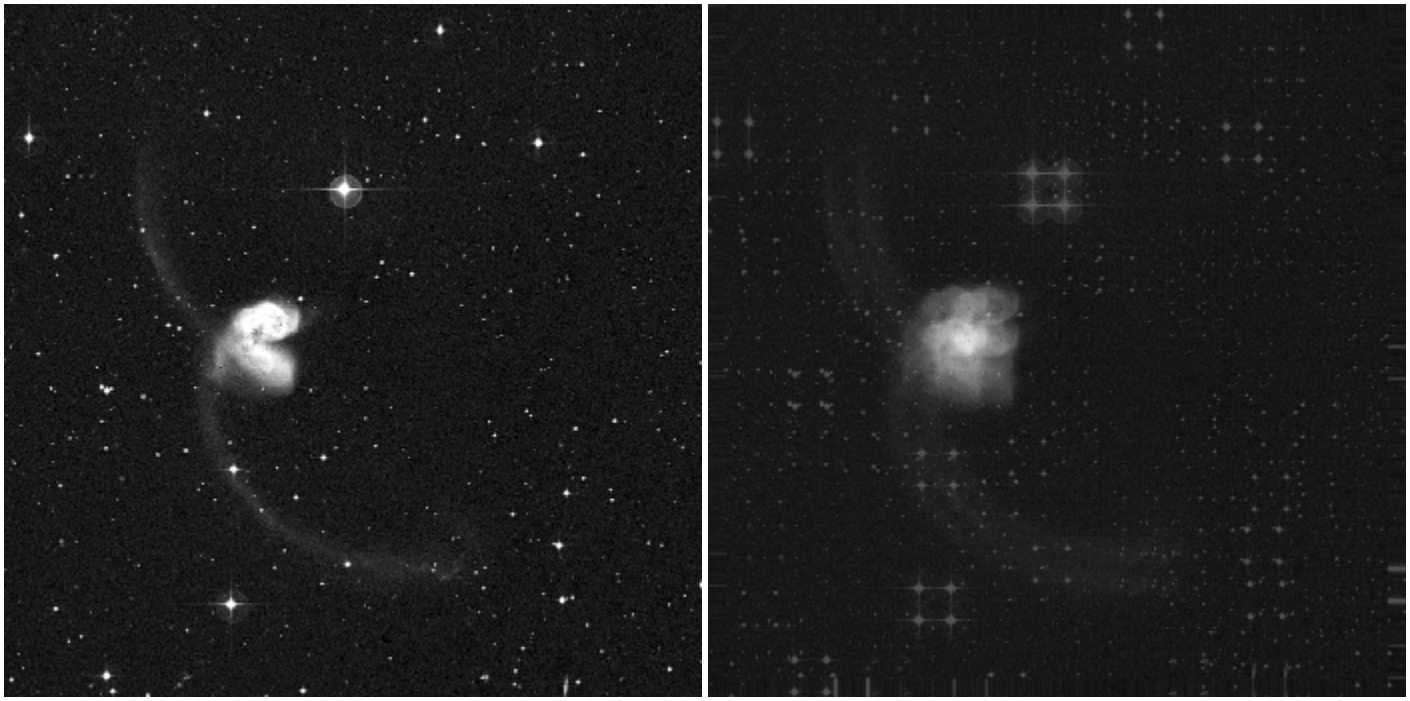
Description: Draws a specified shape and feathers it to the image.

Usage: Draws a circle, ellipse, rectangle or square to create a vignette shape and then a color is feathered to the image, filling either the inside or the outside of the vignette shape.

Effect: Fragment

Description: Averages an image with its shifted copies

Usage: Blurring the image with its shifted copies to make artistic view

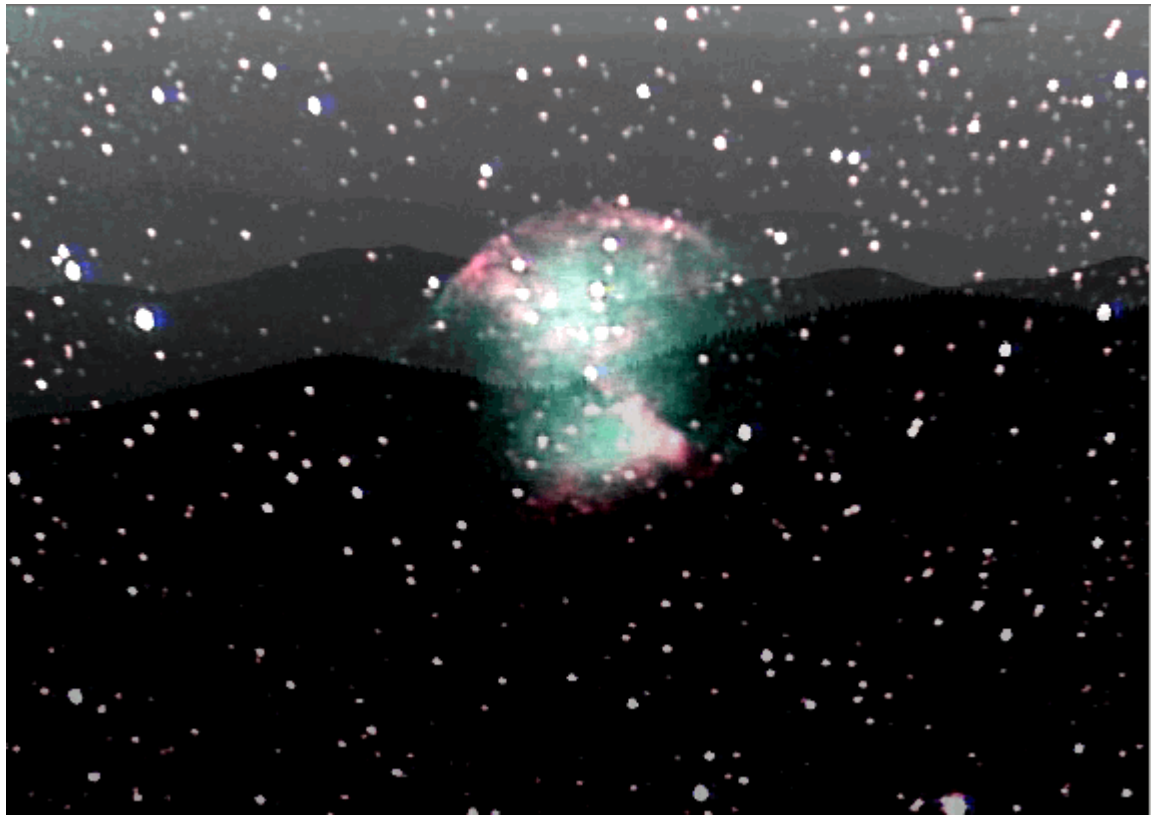


Miscellaneous Effects

Effect: Underlay

Description: Put an image underneath another image

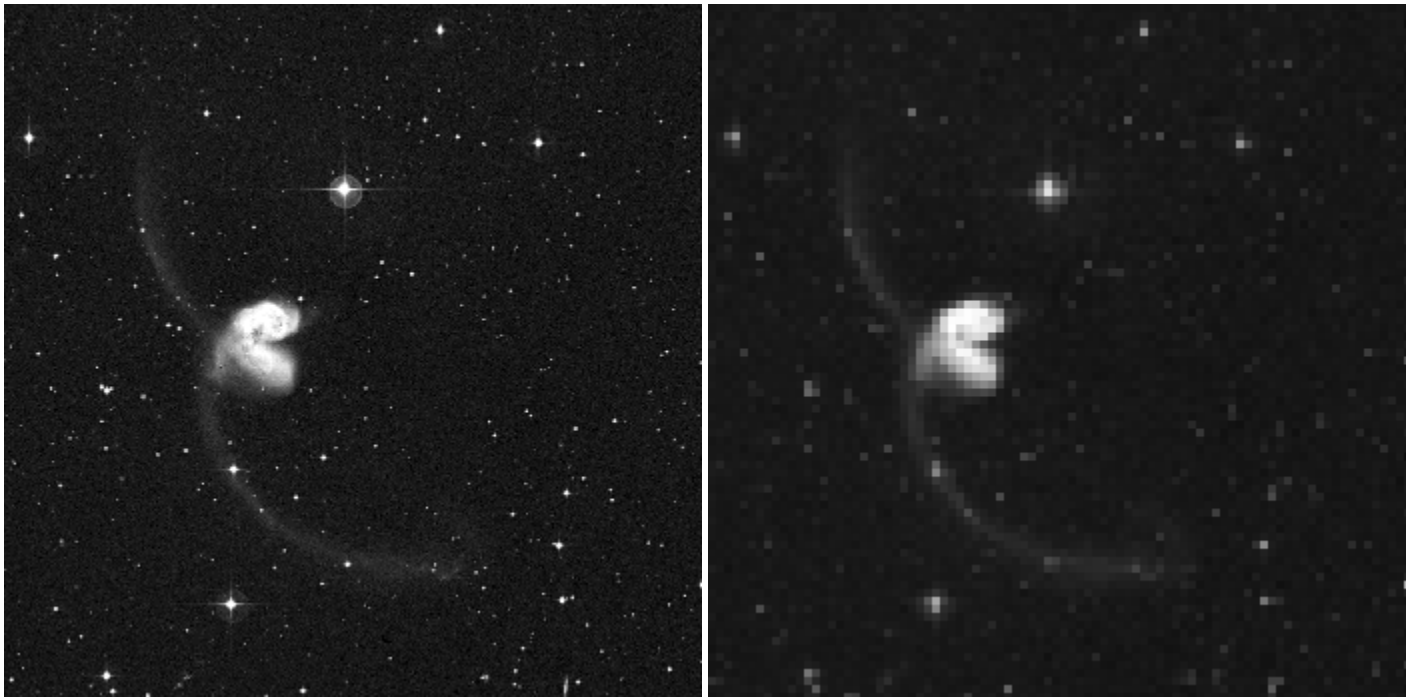
Usage: artistic effect



Effect: Pixelate

Description: Divides the image into rectangular or circular cells and then recreates the image by filling those cells with the minimum, maximum, or average pixel value, depending upon the effect that was selected.

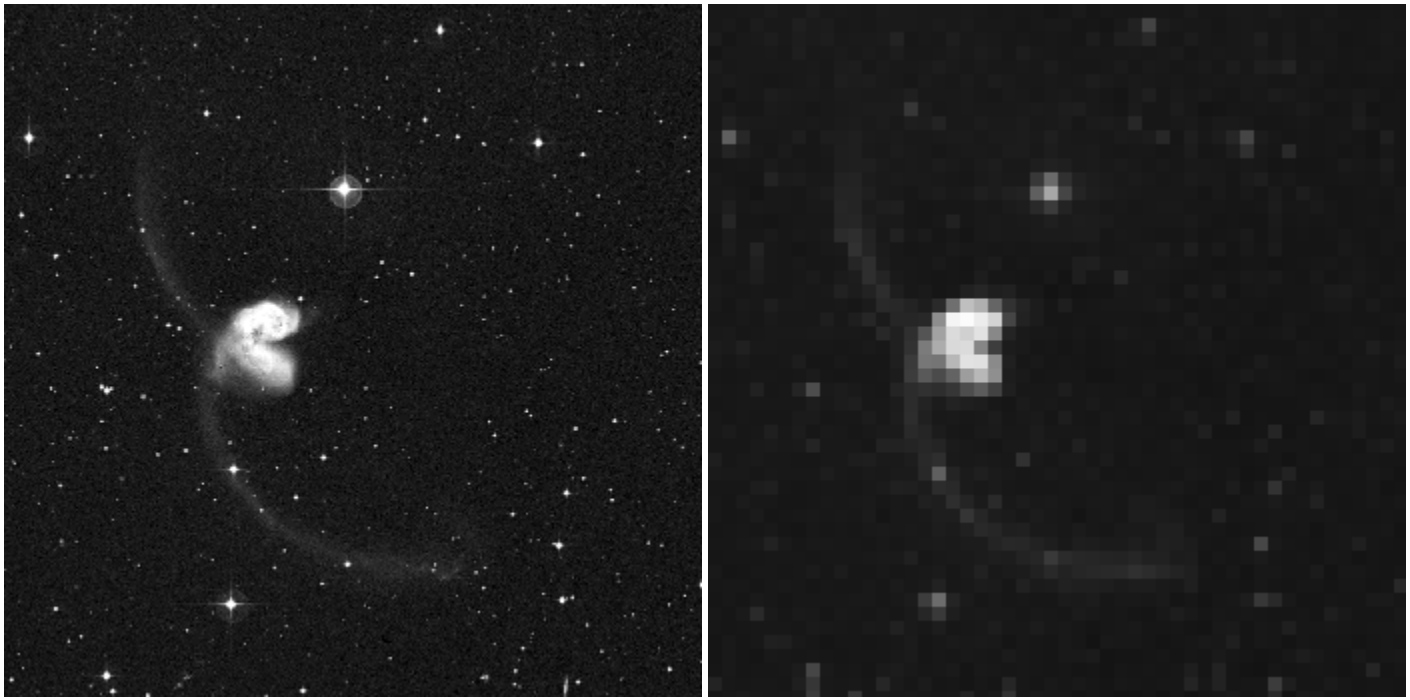
Usage: Divides the image into rectangular or circular cells.



Effect: Mosaic

Description: Imposes a mosaic effect on an image by dividing the image into tiles of a specified size and changing the color of all pixels in each tile to the average color of pixels within the tile.

Usage: Produce blocks pixelation effect.



Effect: Picturize

Description: Replaces the current image with an image created using images present in the specified directory.

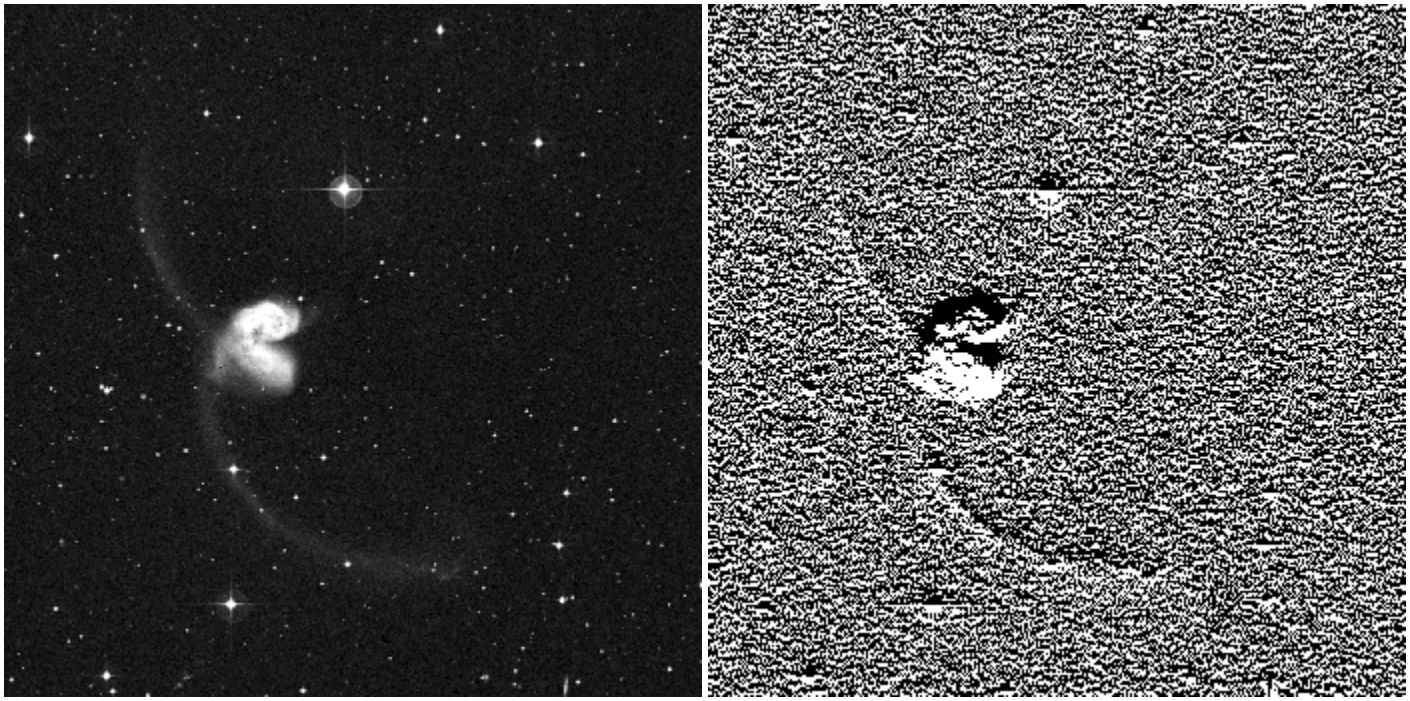
Usage: Pixelate the image from another images thumbnail

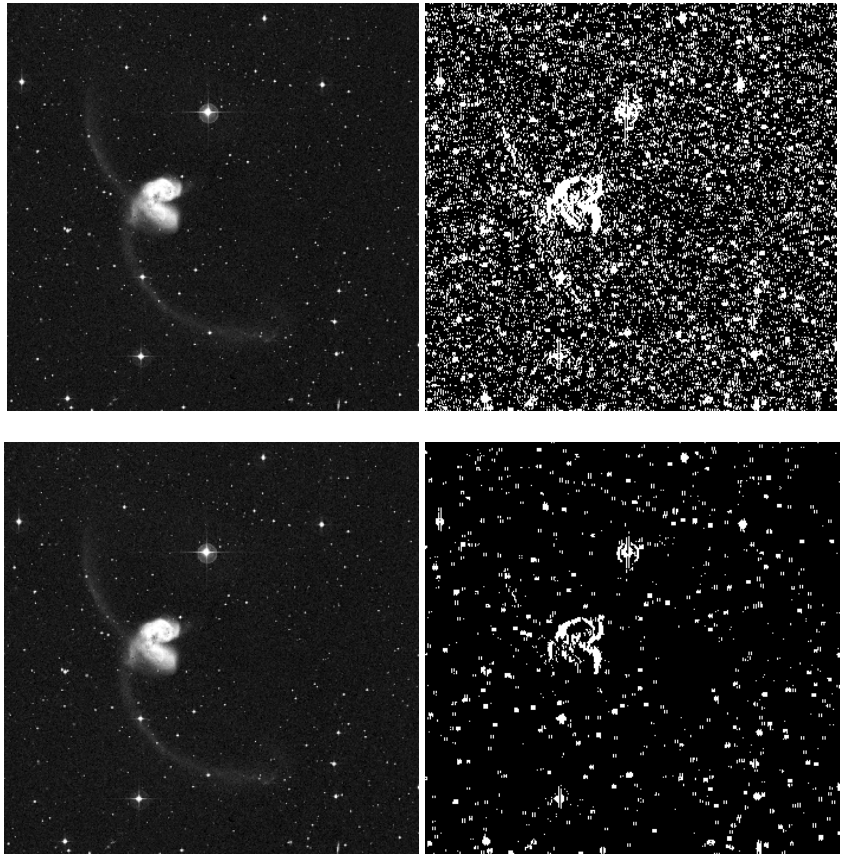
Edge Effects

Effect: Edge Detect

Description: Applies the specified edge filter to the specified image

Usage: Binarize the image and outline the objects

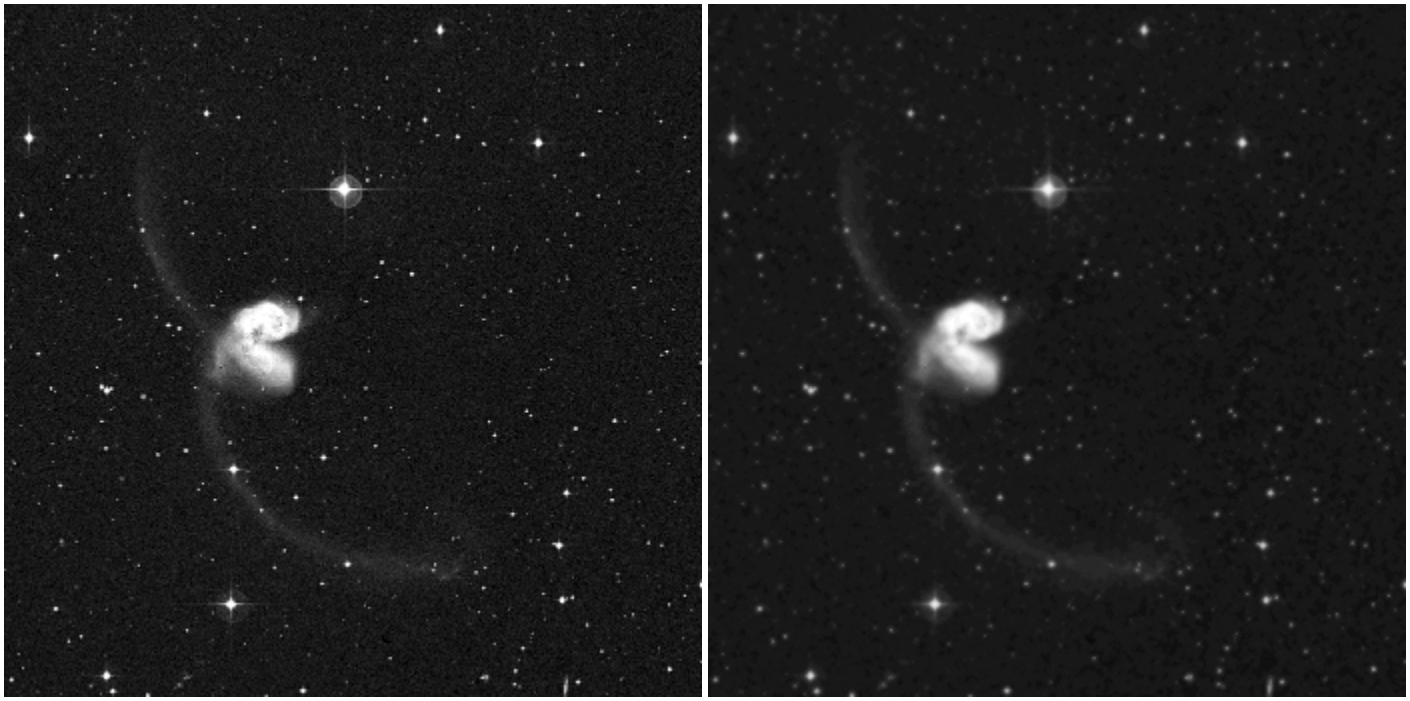




Effect: Smooth Edges

Description: Smoothes the rough edges in the image

Usage: Reduce image variations and remove abrupt sharpen



Effect: Edge Detect Effect

Description: Detects the edges in an image and their strength.

Usage: Detects edges in the image

Spatial Filters

Effect: Spatial - Gradient

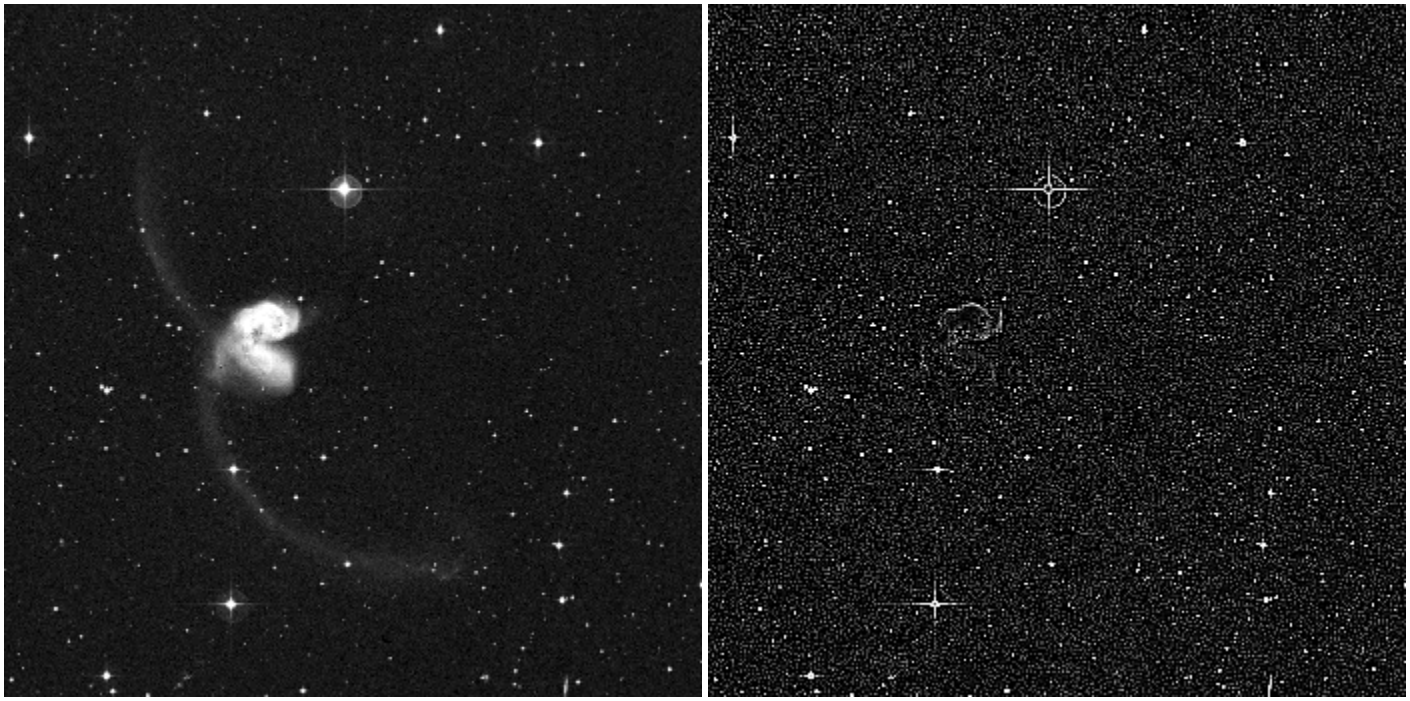
Description: Imposes a spatial filter on an image. You can supply your own filter or use one of the predefined filters.

Usage: Performs a user defined effect by using suitable mask.

Effect: Spatial - Laplacian

Description: Imposes a spatial filter on an image. You can supply your own filter or use one of the predefined filters.

Usage: Performs a user defined effect by using suitable mask.



Effect: Spatial - Sobel

Description: Imposes a spatial filter on an image. You can supply your own filter or use one of the predefined filters.

Usage: Performs a user defined effect by using suitable mask.

Effect: Spatial - Prewitt

Description: Imposes a spatial filter on an image. You can supply your own filter or use one of the predefined filters.

Usage: Performs a user defined effect by using suitable mask.

Effect: Spatial – Shift & Difference

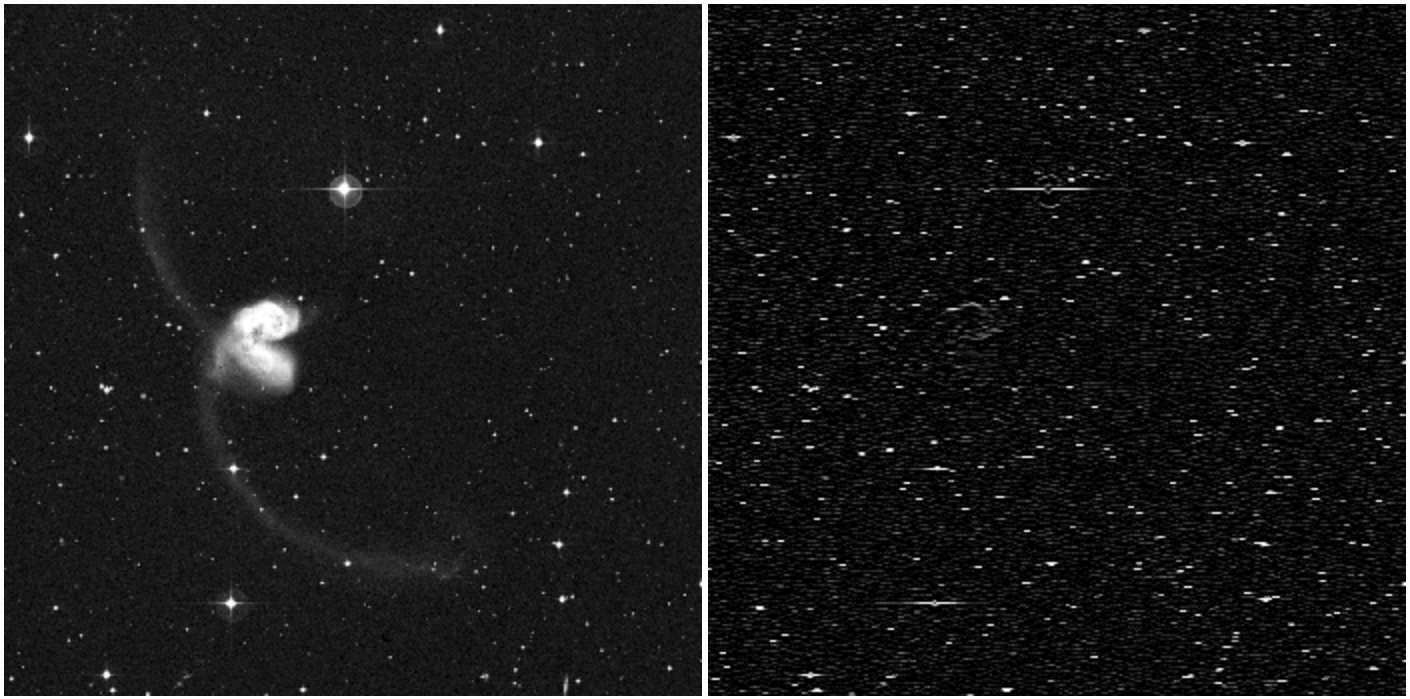
Description: Imposes a spatial filter on an image. You can supply your own filter or use one of the predefined filters.

Usage: Performs a user defined effect by using suitable mask.

Effect: Spatial – Line Segment

Description: Imposes a spatial filter on an image. You can supply your own filter or use one of the predefined filters.

Usage: Performs a user defined effect by using suitable mask.

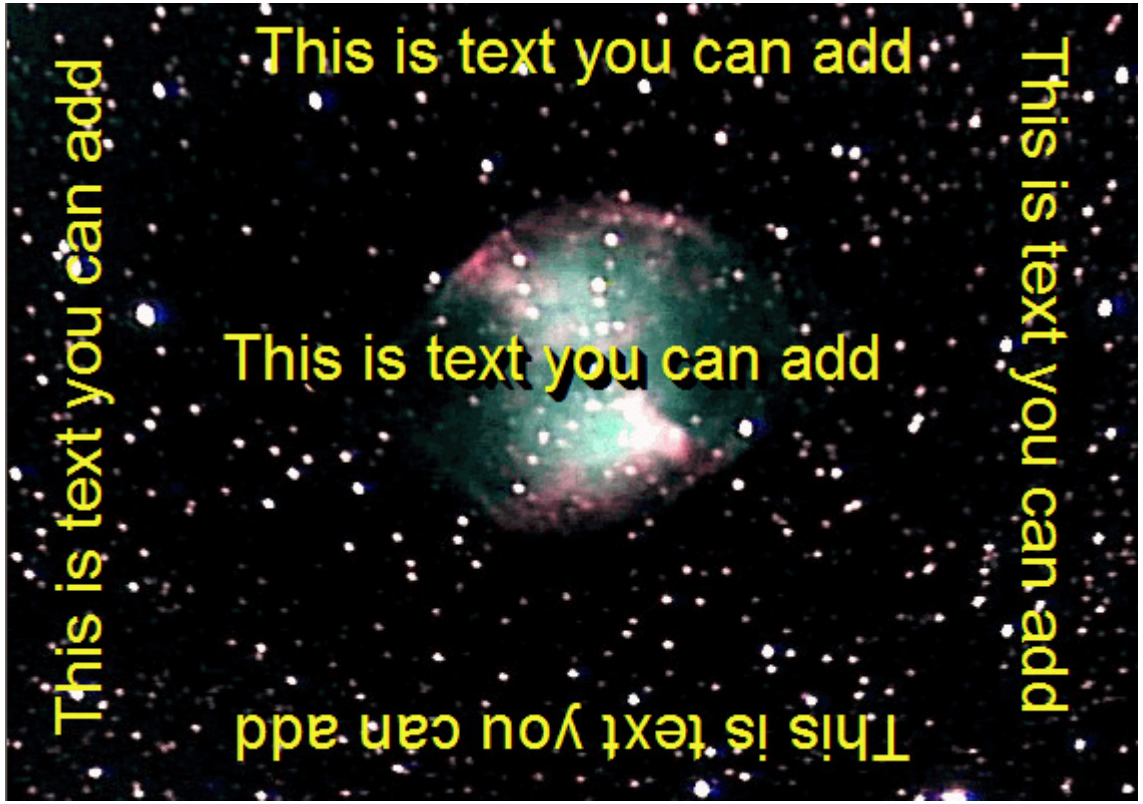


Other Image Effects

Effect: Annotation (Add your own text)

Description: Add text of your choice to an image in a variety of fonts, colors, and orientations.

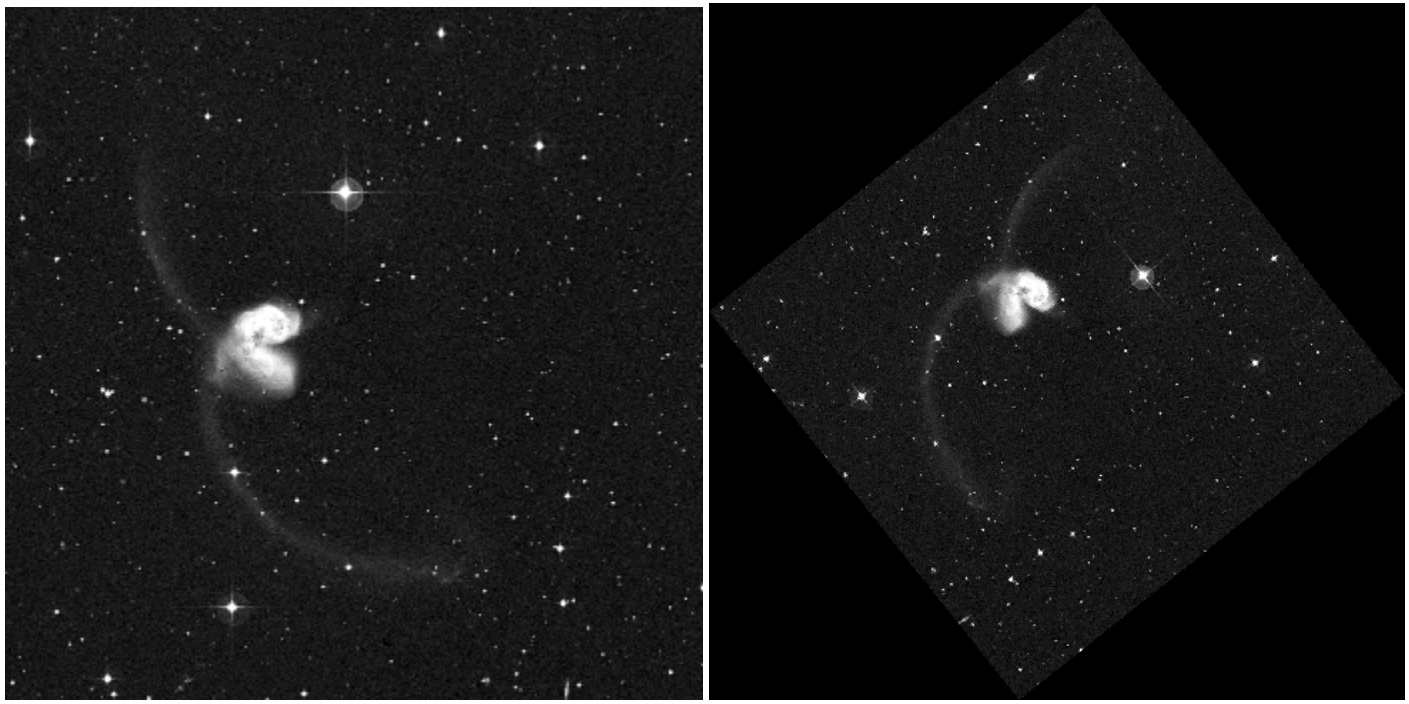
Usage:



Effect: Rotation

Description: Rotate an image any number of degrees

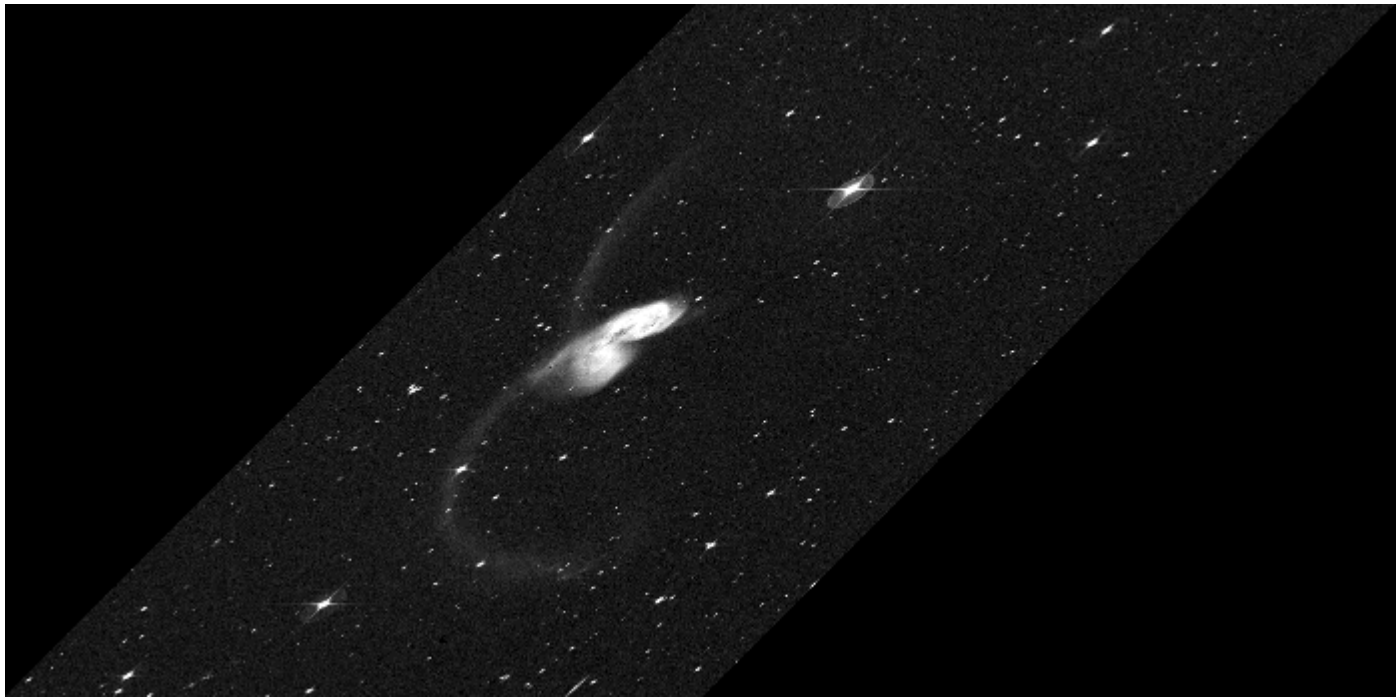
Usage: Use to rotate the object in 1 degree increments



Effect: Shear

Description: Move the corners of the bitmap in the fashion of a parallelogram

Usage: You specify an angle of slant, horizontal or vertical shear, and the fill color for the created space. The angle is expressed in hundredths of degrees, with a limit of 4500 (45 degrees).

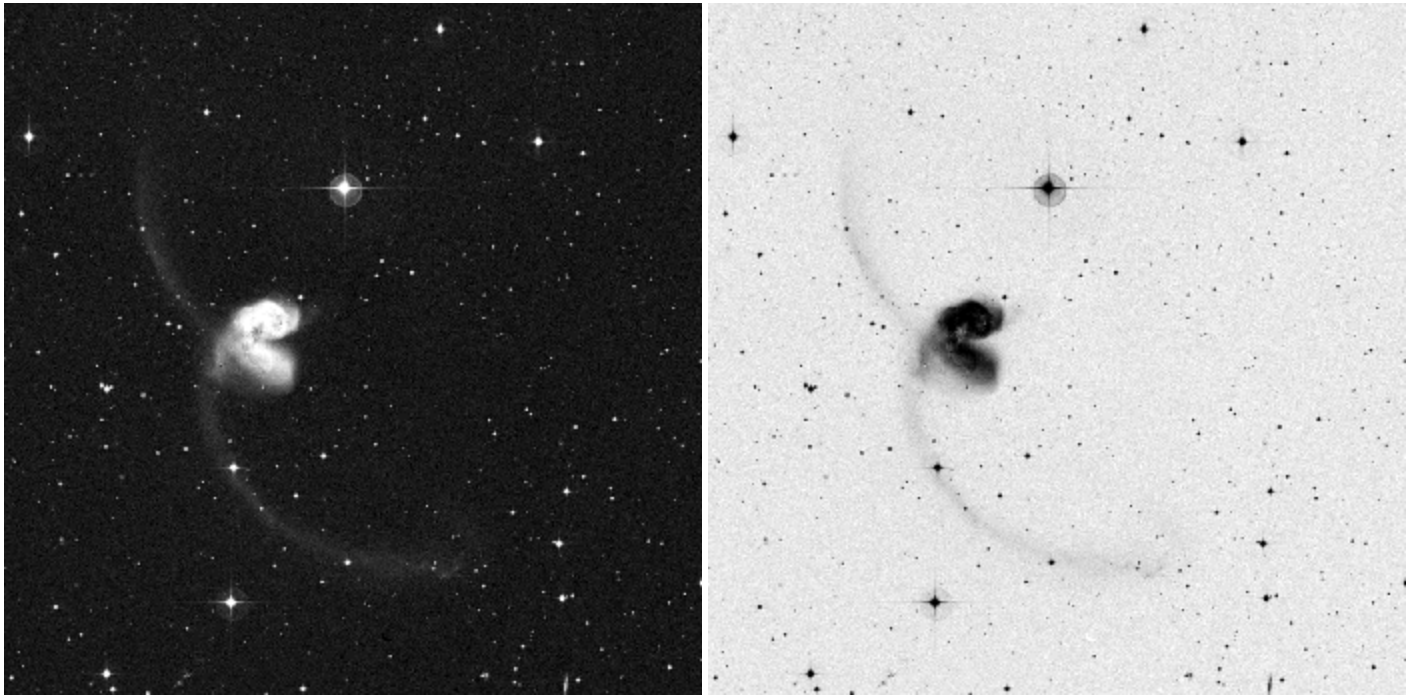


Color and Brightness Adjustments

Effect: Invert

Description: Inverts the colors in the specified image, making it like a photographic negative.

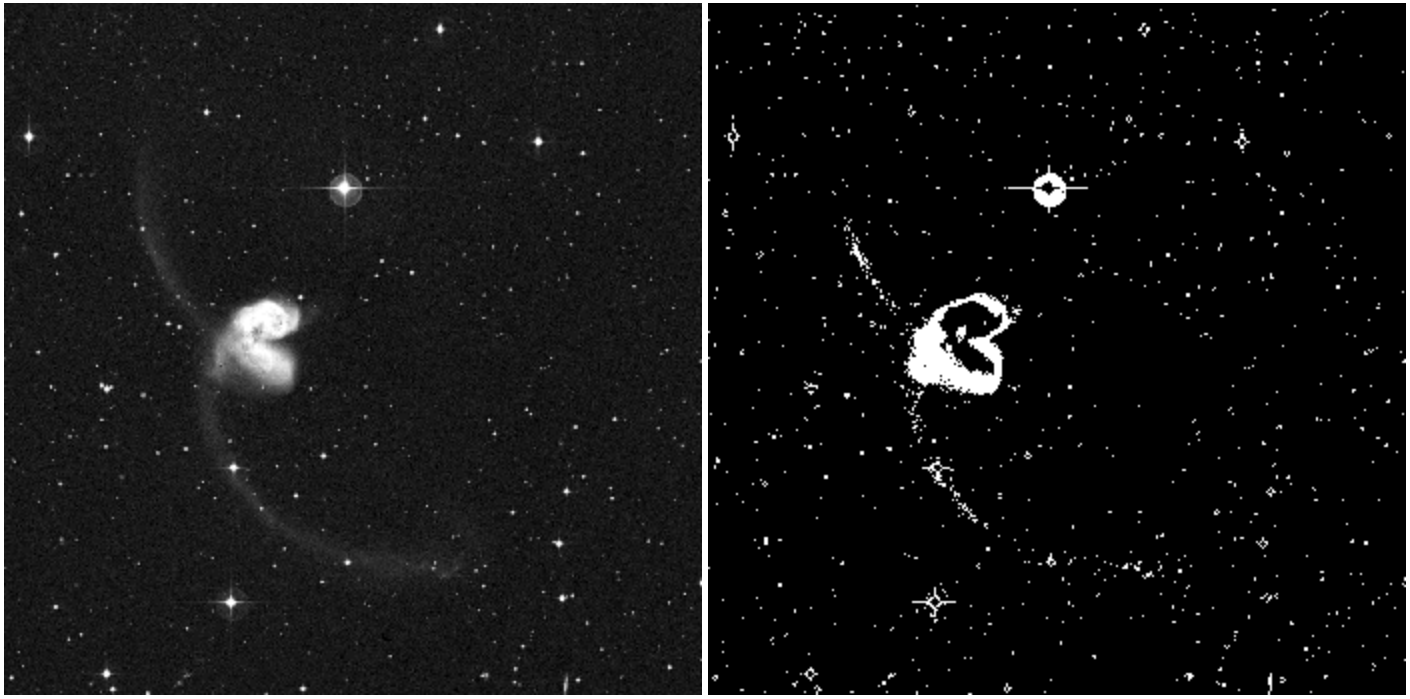
Usage: Converting the image to its photographic negative.



Effect: Intensity Detect

Description: Divides the image into binary segments according to specified thresholds.

Usage: This filter is used to segmenting the image and converting the image into a binary one. Useful for color reduction and segmentation.



Effect: Solarize

Description: Applies an effect that mimics the accidental exposure of photographic film to light. It does so by inverting all color data with an intensity value greater than or equal to the threshold that you specify.

Usage: Creates an effect that look like accidental exposure of photographic film to light by inverting the colors according to user specifies threshold.

Effect: Posterize

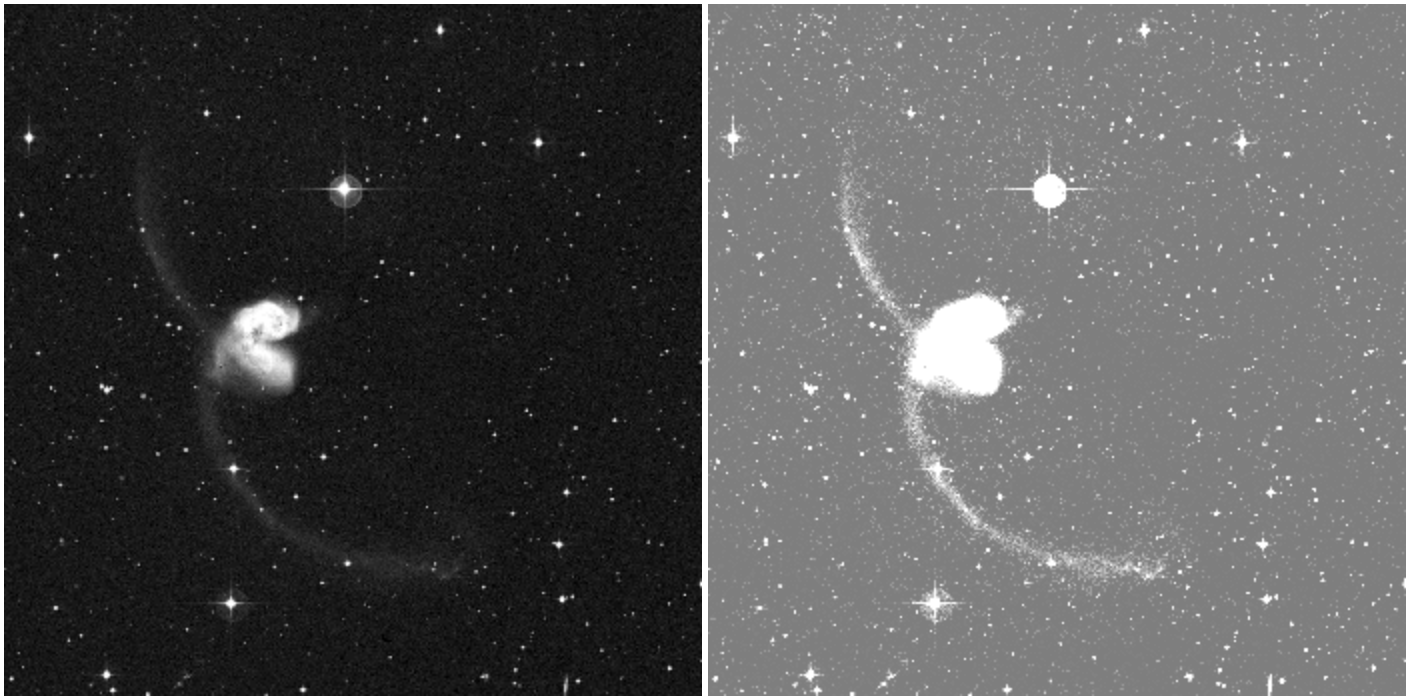
Description: Imposes a poster effect on an image by quantizing the image's colors to a specified number of color levels per plane. For example, two levels mean two of red, two of green, and two of blue.

Usage: Produce the image colors to look like posters.

Effect: Brightness/Contrast Enhancement

Description: Applies contrast, brightness and intensity adjustments to enhance the image tonal range. The transformations are applied in this order: Contrast, Brightness then Intensity.

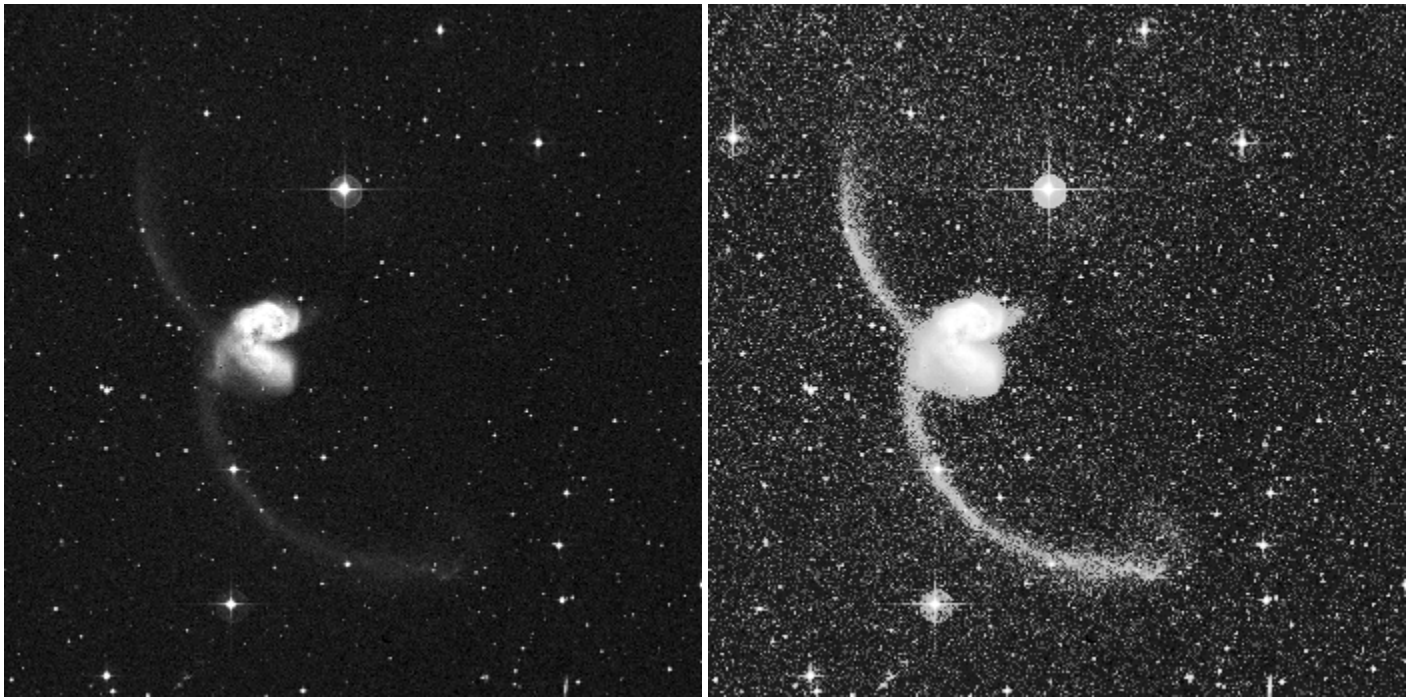
Usage: Adjust the brightness and contrast of the image



Effect: Lighting Control

Description: Lightens or darkens all or part of a bitmap by remapping the pixel values. This method remaps the pixel values of the bitmap across the full range of available pixel values

Usage: Control lighting effect on the image



Effect: Hue

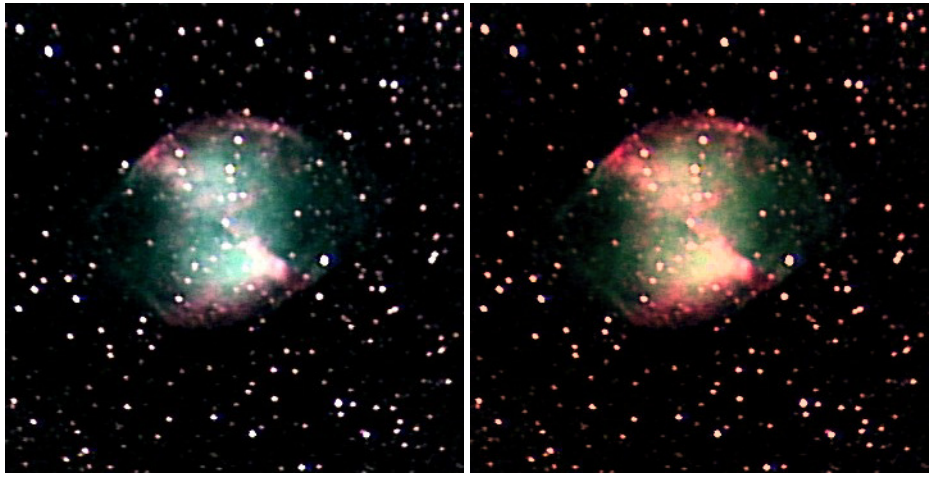
Description: Changes the hue of colors in an image by rotating the color wheel a specified number of degrees.

Usage: This filter is used to change the Chrominance (Hue Channel) of an image.

Effect: Tint

Description: Adjusts the image tint by changing the colors in an image by using two separate color wheel rotations.

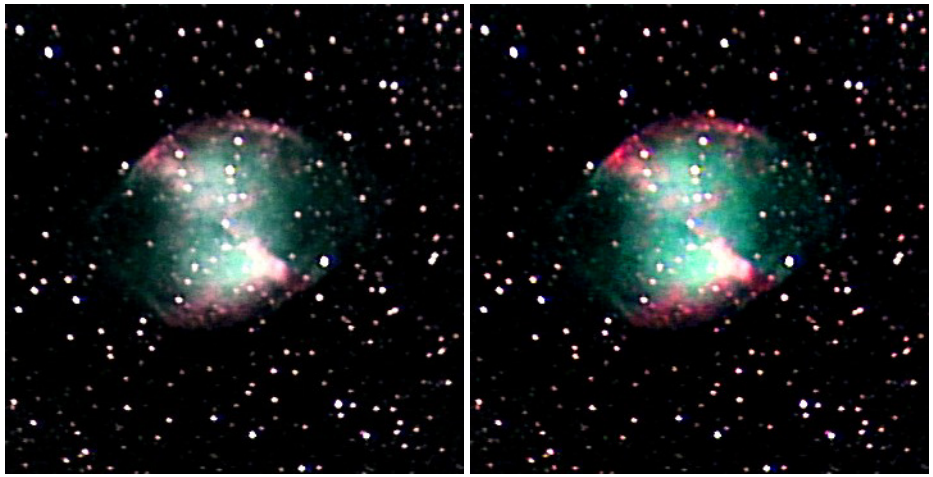
Usage: Swinging the image colors between the red, green, and blue.



Effect: Saturation

Description: Increases or decreases the saturation of colors in an image.

Usage: Changing the chrominance of the image colors (Saturation).



Effect: Color Balance

Description: Redistributes the RGB values of the specified image, using the values stored in the specified structures.

Usage: Balance image colors according to specified weights.

Effect: Convert To Colored Gray

Description: Converts an image to a grayscale image, and then enhances the color components based on the specified parameters.

Usage: Convert grayscale images to a colored one based on channels factors.

Effect: Remap Intensity

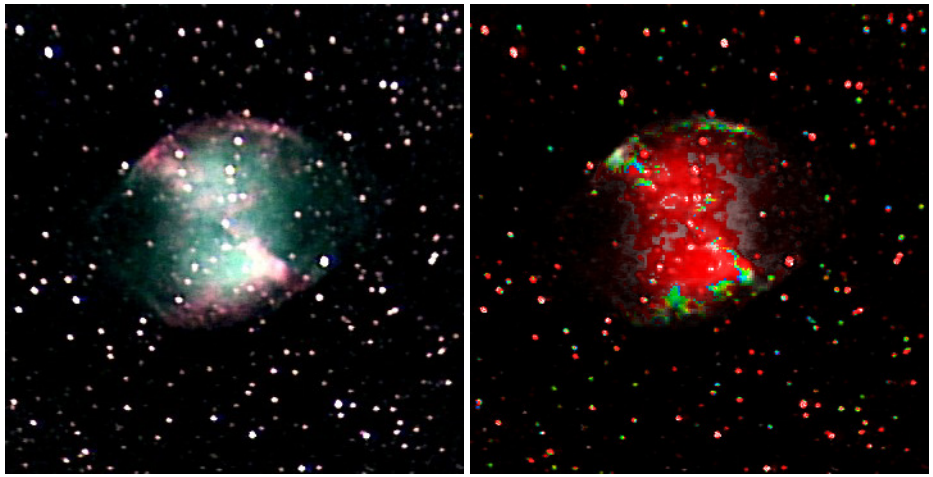
Description: Uses a lookup table to change an image's intensity values. You can apply the change to red, green, blue, or all color channels.

Usage: Remap the colors intensities to user specified values.

Effect: Remap Hue

Description: Uses a lookup table to change an image's hue values.

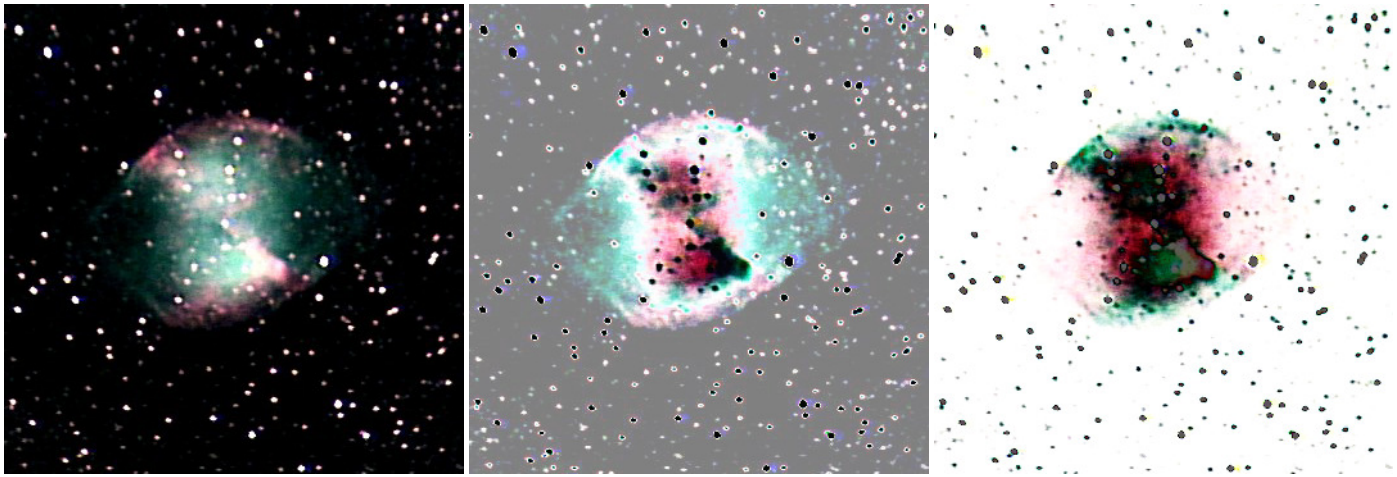
Usage: Remap a range of Hue color values to another range.



Effect: Math Functions

Description: Re-mapping the image colors according to a mathematical function such as square, log, square root, sine and cosine.

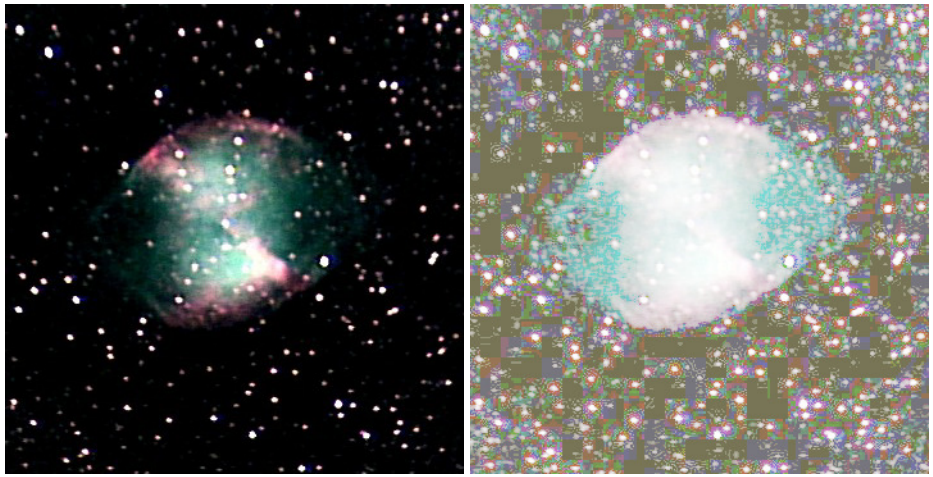
Usage: Re-map image colors according to mathematical functions.



Effect: Histogram Equalize

Description: Linearizes the number of pixels locally in an image, based on the specified color space. This can be used to bring out the detail in dark areas of an image, and smooth the edges between blocks.

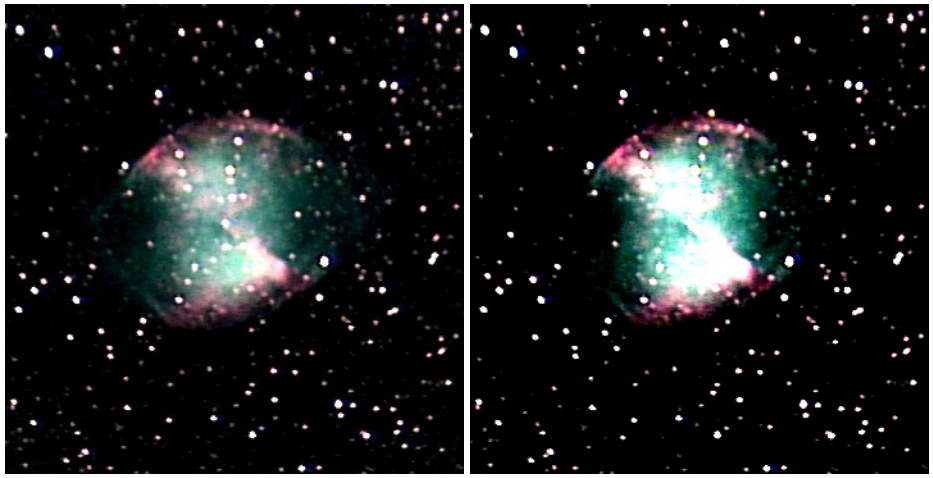
Usage: Enhance contrast near image edges and expose detail in both light and dark regions



Effect: Histogram Contrast

Description: Increases or decreases the contrast of the image using its histogram to determine the median brightness as opposed to using an arbitrary value of 128. This function finds the median brightness of the image, then brightens the pixels with values above the median and darkens the pixels with values below the median.

Usage: This filter is used to Increase or decrease the contrast of an image.



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